VOL. X, NO. 2. 20TH FEBRUARY, 1915.

New Zealand Department of Agriculture,
Industries, and Commerce.

THE

JOURNAL

OF

AGRICULTURE.

Published by direction of
The Right Hon. W. F. MASSEY, P.C.,
Minister of Agriculture, Industries,
and Commerce.

C. E. CUMING, Editor.

WELLINGTON.
BY AUTHORITY: JOHN MACKAY, GOVERNMENT PRINTER.

1915.

THE WAERENGA EXPERIMENTAL FARM—AN EXAMPLE OF THE UTILIZATION OF POOR GUM LAND.

The

Journal of Agriculture.

WELLINGTON, NEW ZEALAND,

20TH FEBRUARY, 1915.

SEEDS AND THEIR IDENTIFICATION.

E. BRUCE LEVY.

THE question of pure seeds is one of vital importance to our agriculture, and is one which should command the closest attention of the individual farmer. Agriculture in New Zealand is becoming year by year more intensive in character. It calls upon the farmer to produce season after season crops from the same soil. This necessarily demands a greater knowledge and a more scientific mode of procedure.

One of the difficulties against which the farmer has to contend is the spread of weeds, the seed of which he has unintentionally sown and propagated in the course of his agricultural operations. Practically every crop is produced from seed, and the value of the crop is very largely determined by the class of seed employed. The dangerous policy of sowing a line of seed without due regard to its purity is too common, and the results of such

sowing can be readily seen in many samples of undressed seeds, samples which frequently contain from 20 to 50 per cent. of weed and other seeds. Samples like these are too often applied direct to the land without first having been machine-dressed; even virgin land, such as bush burns, not being spared. The resultant pasture or crop cannot be otherwise than infested with weeds or their fruit, the existence of which in a pasture or crop reduces the profit-earning power of the land, and is a serious monetary loss, which, by reason of the effect not being at once apparent, is not appreciated as it should be. It must be borne in mind that most weed-seeds are of a quick-germinating energy, while most of our permanent grasses, such as cocksfoot, crested dogstail, *Poa pratensis*, &c., germinate slowly. In fairly dry weather months may elapse before they show above ground. Quick-germinating seed, therefore, has a decided advantage in the contest for supremacy in the formation of pasture.

When sowing seeds the farmer must necessarily sow a certain percentage of weed-seeds. No line of seeds can be guaranteed to be absolutely free of weed-seeds, and the variation in weed-seed content is enormous. It is therefore advisable that the farmer be able to decide whether the line he is sowing contains an excess of undesirable seeds or not. Then, again, it is not only the quantity of weed-seeds present but also the determination of what these weed-seeds are that is important. Thus, for instance, of two lines of seeds I recently examined, one contained 7 per cent. of weed-seeds and the other about $\frac{1}{5}$ per cent. In the former the weed-seeds were very noticeable, but the sample contained nothing of a very serious nature. The second sample, however, contained ox-eye daisy at the rate of 140 seeds per pound. Unless this sample had been very carefully examined one would have thought it to be an excellent line; whereas, really, the former would be preferable to sow, although under no consideration whatever should such a weed-seed-infested line be employed.

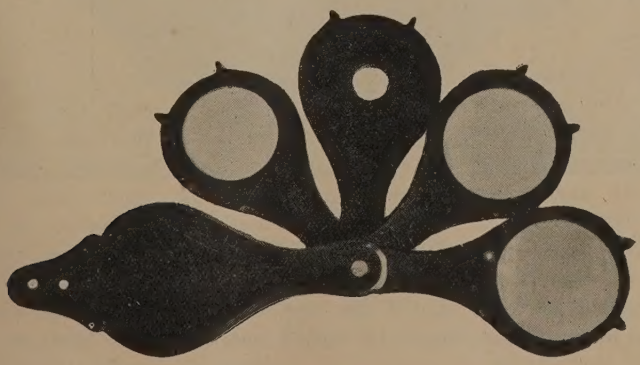
Some weeds, perhaps, are of little consequence in a pasture, although the amount of damage they do is very seldom accurately gauged. A farmer sees his sheep walking over the field nipping off the flower-heads of catsear, and he might be inclined to think that catsear was a very desirable constituent of the pasture; but were he to consider the amount of ground occupied by the radial, low-lying leaves of the catsear, he would soon recognize that the few flower-heads produced by the plant were extremely dear food for his sheep. Again, one often hears the remark, "I like to see Scotch thistle [or such-and-such a weed] growing in a place:

it shows the land is good." Such erroneous ideas of the "value" of weeds are by no means uncommon.

The question may be asked, Is the farmer justified in spending his valuable time in sitting down and carefully examining the seed that he intends to sow, or is it for him a task beyond the sphere of practicability? As a matter of fact, seed-identification is by no means a lengthy or a difficult task, and it should from a farmer's standpoint be looked upon as essential in the training of a man destined for the land—just as essential, in fact, as are grafting and budding to the nurseryman. From a sound business standpoint the farmer should be able to identify weed and other seeds. It is with the object of furnishing him with a simple guide in this necessary work that these notes, the first of a series, have been prepared.

Seed-identification should be taken up not only by the farmer, but also, may it be suggested, by the agricultural classes of primary and secondary schools. Agriculture is taught in practically every country school, and wherever possible each school has its garden where practical work is carried on. Seed-identification, one of the most important phases of agriculture, has not been generally taken up. It is a field in which the cost of material is very small, and one which should constitute a useful and interesting sphere of activities for agricultural classes.

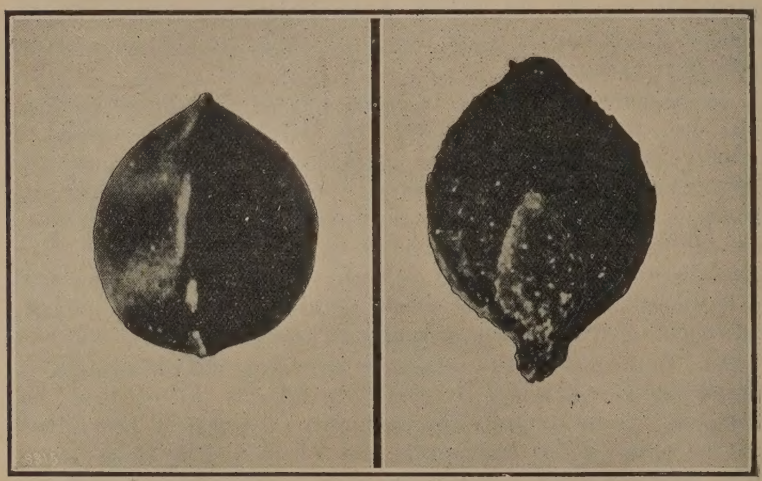
The only instrument necessary for weed-identification is a magnifying-glass capable of enlarging objects to at least ten diameters. Such a glass, an illustration of which is here given, can be obtained for the small sum of 3s. 6d. (postage extra) from firms supplying scientific apparatus. This glass is called a triple magnifier, with diaphragm, and for the money is really



TRIPLE MAGNIFIER, WITH DIAPHRAGM. ACTUAL SIZE.

a good article. For general seed-work two lenses used without the diaphragm are ample, but to ensure a good magnification the three lenses with diaphragm are necessary. Readers who intend following up these notes should procure one of these or a similar lens. To use the lens, place the object in a good light and hold the lens about $\frac{3}{4}$ in. above it, keeping the eye from $1\frac{1}{2}$ in. to 3 in. above the lens.

In each of the descriptions are given the chief commercial seeds in which the seed described is found as an impurity. To those desirous of following up these notes the following suggestion



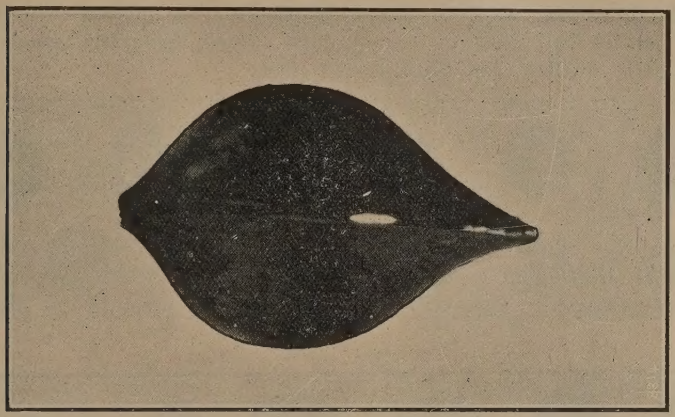
SORREL (RUMEX ACETOSELLA). DEVOID OF PERIANTH.

SORREL (RUMEX ACETOSELLA). PERIANTH ATTACHED.

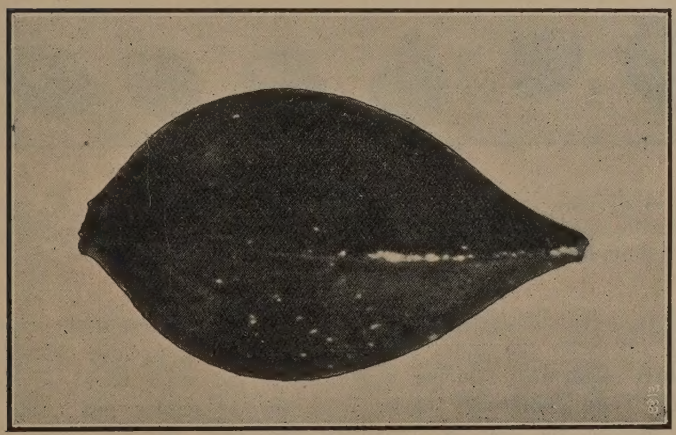
BOTH ENLARGED 31 DIAMETERS.

is made: Procure, by collecting, or from a seedsman, 3 oz. or 4 oz. of the seed (students in agricultural classes will need about 2 oz. each) in which the impurity is found, and into this place a few authenticated seeds of the weed-seed or seeds described, picking these out again and naming them from the illustrations and descriptions given. If not otherwise stated, small supplies of the weed-seeds described may be procured, free of charge, on application to the Biologist, Department of Agriculture, Wellington. The samples procured should be free of other weed-seeds, or if any are present they should be picked out before the ones to be identified are put in.

The first of these notes will be occupied in the description of the "seed" of three of our most common weeds — viz., sorrel (*Rumex acetosella*), curled dock (*Rumex crispus*), and broad-leaved



CURLED DOCK (RUMEX CRISPUS).



BROAD-LEAVED DOCK (RUMEX OBTUSIFOLIUS).

BOTH ENLARGED 31 DIAMETERS.

dock (*Rumex obtusifolius*). These three "seeds" (the seed of the species of *Rumex* is called an achene or nut) are alike, inasmuch as each is triangular in form.

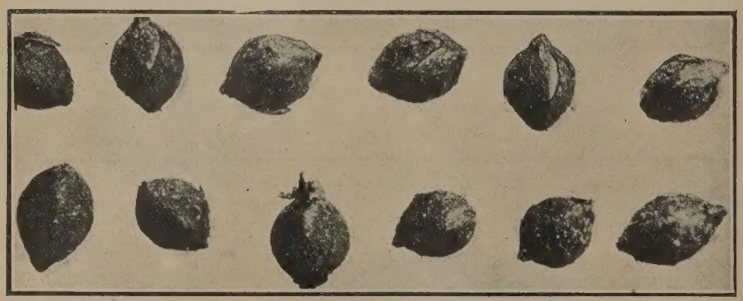
Average size of the three nuts :—	Length.	Width.
Sorrel	$\frac{1}{20}$ in.	$\frac{1}{28}$ in.
Curled dock	$\frac{1}{12}$ in.	$\frac{1}{19}$ in.
Broad-leaved dock	$\frac{1}{11}$ in.	$\frac{1}{18}$ in.

Of the three, sorrel is the most easily distinguished. In size it is about half that of curled dock, which, generally speaking, is a little smaller than broad-leaved dock.

SORREL.

Sorrel is found in commercial seeds in three quite different forms, viz. :—

(1.) Nut closely covered with a dull, reddish-brown, rough covering, bearing in each of its three faces a branching vein more or less distinct. This covering is called the perianth, or floral



SORREL (RUMEX ACETOSELLA).
TOP ROW: WITH INNER AND OUTER SEGMENTS OF THE PERIANTH ATTACHED. BOTTOM ROW: WITH OUTER SEGMENT OF PERIANTH REMOVED. ENLARGED 10 DIAMETERS.

envelope. The perianth of the species of *Rumex* consists of two floral envelopes, an inner and an outer, each envelope consisting of three segments. During development the inner floral envelope enlarges and completely closes over the triangular nut. At the stem end of the seed in specimens that have not been subjected to much knocking about the outer floral envelope is attached and consists of three small segments, each segment overlapping a ridge and clinging closely to the inner floral envelope.

(2.) *When the Perianth has been removed.*—The perianth is difficult to remove, and hence only in heavily dressed lines is the seed found in this form. The nut devoid of perianth is shiny and

of a reddish-brown or amber colour, each end, particularly at the stalk end, being a trifle darker than the rest of the nut. The ridges of the nut are blunt or rounded, and are not nearly so well defined as are those of the nut of curled dock and broad-leaved dock. The apex or point of the nut is more pointed than is the base, which is nearly oval.

SORREL (RUMEX ACETOSELLA).

TOP ROW: NUT DEVOID OF PERIANTH. BOTTOM ROW: NUT WHEN THE SHINY COAT HAS BEEN REMOVED. ENLARGED 10 DIAMETERS.

(3.) *When the Shiny Coat has been removed.*—This is the most rare of the three forms, and is present only in those samples that have been very heavily dressed. The nut still retains its triangular form, but the furrows between the ridges appear more marked. The colour of the nut is a pale-straw colour, with darkened base and apex, particularly the base. The nut itself is semi-translucent—*i.e.*, very slightly transparent. The base and apex of the nut are more flattened.

The form with perianth attached is the most common, and is found chiefly in rye-grass. White clover, however, is the seed in which sorrel in all three forms is most frequently found.

CURLED DOCK AND BROAD-LEAVED DOCK—COMPARATIVE DESCRIPTION.

(1.) The seed of these two docks are found in samples in the same three different forms as is sorrel, but the nut devoid of perianth is by far the more frequently found. The nut of the two docks is covered by the inner floral envelope of the perianth in the same manner as is that of sorrel. The floral envelopes differ, however.

Curled dock and broad-leaved dock may be identified from each other by the following differences in the perianth, particularly the inner floral envelope. The envelope of curled dock is formed of three brown, typically heart-shaped wings, the edges of which are entire—*i.e.*, have no teething or notchings on them. The wings

of broad-leaved dock are not heart-shaped, but take more the shape of a triangular spear-head, having the corners slightly rounded. The edges of the wings are not entire, having from the middle to the base a few well-developed teeth, one at least ending in a fine point. These teeth are the best means of distinguishing these two "seeds" when the perianth is present. On one wing of both these docks, and sometimes on all three wings, is an egg-shaped tubercle, which, generally speaking, is a little brighter in colour than the wing on which it is situated. A tinge, varying from pink to deep rose, is often noticed. The tubercles are different, inasmuch as that on broad-leaved dock elongates at the apex

CURLED DOCK (RUMEX CRISPUS), SHOWING TUBERCLE AND ENTIRE EDGE.

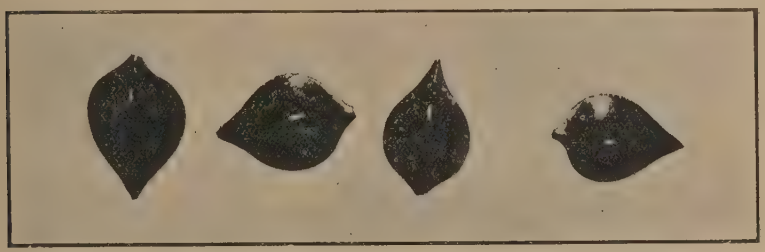
BROAD-LEAVED DOCK (RUMEX OBTUSIFOLIUS), SHOWING TUBERCLE AND TOOTHED EDGE.

BOTH ENLARGED 10 DIAMETERS.

and continues as a strong vein for a short distance down the wing, while that of curled dock does not so elongate, but ends in a perfect oval, the vein seeming to come from under the tubercle. The veins on the wing of curled dock are much more uniform and complete, branching in a regular manner from the main axis. Those of broad-leaved dock are very irregular, and seem to arise indefinitely from the base end of the wing; the strongest veins arising here branch and finally join to form the well-defined teeth.

In both docks the outer floral envelope is present, and each segment of it overlaps, but not closely as in sorrel, one of the ridges of the nut.

(2.) *With Perianth removed.*—This is the form in which these two species of dock are most commonly found. The nuts are more difficult to distinguish than when covered by the perianth. The main distinctions are: curled dock is of a rich reddish-brown colour, and is very shiny; while broad-leaved dock is a dull light brown, and is very much less polished. The shape of the two nuts is a little different: curled dock is not so long proportionately to its width as is broad-leaved dock. The ridges of curled dock are very prominent, being a little more so than those of broad-leaved



CURLED DOCK (RUMEX CRISPUS).

BROAD-LEAVED DOCK (RUMEX OBTUSIFOLIUS).

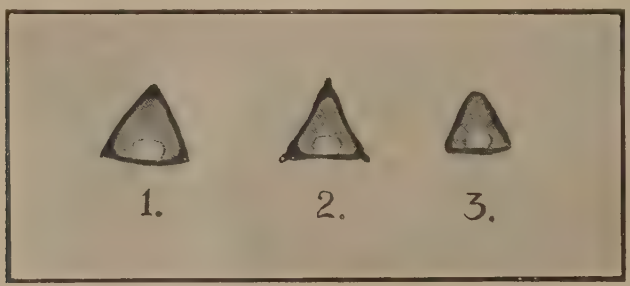
BOTH ENLARGED 10 DIAMETERS.

dock. In colour, the ridges of curled dock are, in general, a little darker than the sides of the nut, while those of broad-leaved dock incline more towards the same or even a little lighter colour than the sides. Towards the base of the nut the ridges in curled dock become slightly concave, while those of broad-leaved dock are nearly always straight, sometimes very slightly concave. The apex of curled dock is sharp, but is not so drawn out as that of broad-leaved dock. This drawn-out apex on the latter accounts for its greater length proportionally. The apex of each nut is

similar to the base, inasmuch as the ridges of curled dock are slightly concave, while those of broad-leaved dock are nearly always straight and at times very slightly concave.

(3.) *Nut with Shiny Coat removed.*—This form is very rare, being found only in very heavily dressed lines of seed. It is impossible to distinguish the species when the perianth and shiny coat have been removed. The nut devoid of seed-coat is of a reddish colour, and is semi-translucent.

Curled dock has been found chiefly in lucerne; broad-leaved dock has been found chiefly in cocksfoot.



SECTIONS OF: 1. BROAD-LEAVED DOCK. 2. CURLED DOCK. 3. SORREL. ENLARGED 10 DIAMETERS.

The following table, compiled from analyses made in the laboratory, shows the relative frequency of occurrence of these three "seeds" in the main agricultural seeds:—

Agricultural Seed in which found.	Of 100 Samples examined—		
	Sorrel was present in	Curled Dock was present in	Broad-leaved Dock was present in
Perennial rye-grass	49	4	6
Italian rye-grass	39	14	7
Cocksfoot	14	19	14
Crested dogstail	51	4	1
Chewing's fescue	62	..	2
Timothy	46	12	..
Fiorin	52	..	..
Meadow-foxtail	36	4	4
Poa pratensis	38	14	2
White clover	95	5	..
Alsike	71	14	2
Red clover	38	22	8
Cow-grass	33	27	5
Lucerne	10	33	6
Lotus	73	3	..

Also in the following seeds :—

Sorrel was noted in	Curled Dock was noted in	Broad-leaved Dock was noted in
Suckling-clover.	*Poa trivialis.*	*Phalaris bulbosa.*
Poa nemoralis.	*Phalaris bulbosa.*	Rib-grass.
Crimson clover.	Meadow-fescue.	Prairie-grass.
Meadow-fescue.	English trefoil.	
Red fescue.	Crimson clover.	
Sheep's fescue.	Yorkshire fog.	
Danthonia pilosa.	Tall fescue.	
Poa trivialis.	Ratstail.	
Hard fescue.	Rib-grass.	
Tall fescue.	Prairie-grass.	
Yorkshire fog.		
Brown-top.		
Western Wolths rye.		
Rib-grass.		
Yarrow.		
Bokhara clover.		
Prairie-grass.		

AUTUMN SOWING OF LUCERNE.

It is the practice in most parts to sow lucerne during the spring. There seems to be no reason why this sowing should not be practised in autumn in localities not subject to severe winter conditions. For this purpose the seed should be sown early in March, in order to have well-established plants before the winter frosts set in. The addition of a bushel of barley would act as a nurse crop and protect the young plants of lucerne during their first winter. Especially is it recommended that in those districts lately affected by drought growers should attempt autumn sowing, in order to have well-established plants before the following summer. Autumn sowing of lucerne might well be practised in the districts where clovers thrive when autumn-sown.—*W. S. Hill, B.Agric.*

The present dry season, and the failure of grass and crops in many districts, emphasizes the great value of lucerne as a drought-resisting plant. The established lucerne-field is an unfailing source of profit.

I found my journey to New Zealand very profitable. You have a great country, and I am delighted at the practical way in which you are developing the breeding industry.—*Dr. C. B. Davenport, Director of the Carnegie Institute for Experimental Evolution, Cold Spring Harbour, New York.*

LUCERNE:

ITS VALUE DURING A DRY SEASON.

W. S. HILL, B.Agric.

FROM when it was first demonstrated at the Moumahaki Experimental Farm that lucerne does not demand a specially favourable environment, such as alluvial flats, its extended use in this country was considered advisable as the principal means of supplementing pastures. It is only during the present season that its great value as a drought-resister has been appreciated. A visit to Marlborough at the present time would convince the most captious critic that lucerne stands alone as a green fodder crop in a dry season. The whole countryside presents a burnt-up appearance except for the fields of lucerne which relieve the eye. Here and there the green patches indicate where lucerne is demonstrating its ability under the most adverse conditions to maintain a supply of succulent fodder for stock. Never before have the farmers of the district been under the necessity of grazing their lucerne-fields so bare. But little rain has fallen during the past six months,* yet lucerne has stood the test, and is distinctly the best asset at present possessed by Marlborough farmers. So great have been

* Following is the rainfall for Marlborough in the final half of the last year, provided by courtesy of the Rev. D. C. Bates, Government Meteorologist :—

	Blenheim.		Ward.		Seddon.	
	Inches.	Days.	Inches.	Days.	Inches.	Days.
July	0·69	6	0·47	6	0·35	2
August	0·52	6	0·82	4	0·37	3
September	0·36	5	0·50	4	0·28	3
October	0·90	2	0·43	2	0·07	2
November	1·08	11	1·13	11	0·99	9
December	0·59	5	0·67	6	0·42	4
Total	4·14	35	4·02	33	2·48	23
Average monthly rain for six months	0·69		0·67		0·413	

THE SECOND CROP OF LUCERNE HAY FROM A TWENTY-YEAR-OLD STAND AT SUNNYSIDE MENTAL HOSPITAL, CHRISTCHURCH.

ONE OF THE FIELDS OF LUCERNE ON MR. R. H. SMAILE'S PROPERTY, MARLBOROUGH, BEING SAVED FOR SEED.

BALING LUCERNE HAY ON MESSRS. ADAMS BROS.' FARM AT BLENHEIM.
W. S. Hill, photos.

the demands on this crop for grazing and for hay that the area shut up for seed purposes has been necessarily reduced. It is only on the rich alluvial river-deposit areas that the king of fodder plants is clothed in his royal purple.

There is no doubt that the experience with lucerne in Marlborough and in other districts during this season will give a great fillip to its extended use. Marlborough is specially favoured for lucerne-growing in that good crops have been established and have been grown for a generation without the use of either lime, inoculated soil, or artificial fertilizers, which are apparently essential in other parts. To what extent the crop would be benefited by the use of these stimulants is practically unknown. Lucerne-growers on the rich alluvial flats are for the most part content

MR. ROBERT ALLEN, OF BLENHEIM, IN HIS LUCERNE-SEED CROP.
W. S. Hill, photo.

with present returns. Those attempting the culture of lucerne on the less rich lands and the low hills might benefit considerably by experiments in this direction. The close proximity of unlimited quantities of good limestone for agricultural purposes, as yet unworked, is a great natural asset. Although the season has been the driest on record, but few growers have adopted dry-farming methods. The creation of a soil-mulch on lucerne-fields after being cut or fed off would have greatly augmented the yield of numerous stands. At the present time many fields are so hard that it would be most difficult to stir the surface.

The climate of the Marlborough Province is peculiarly suitable for the production of farm and garden seeds. Lucerne-seed of high purity and germination is grown. The crop produced at

Moumahaki Experimental Farm from seed grown in Marlborough has been found to be superior to that grown from Hunter River seed.

There is a cruciferous weed, the rocket (*Eruca sativa*), which is principally known as a source-indicator of European, Asiatic, and American seed. It is significant that this weed, although practically unknown to Marlborough lucerne-growers, has appeared in several plots sown with seed purchased in New Zealand as Marlborough lucerne. As the crop produced by this seed is two-thirds the weight produced by Marlborough or Hunter River seed, the attention of farmers is directed to the point. This season much of the Marlborough seed will be placed on the market in 50 lb.

A PLANT OF THRIVING LUCERNE ON A DROUGHT-STRICKEN MARLBOROUGH HILL, THE SURROUNDING GRASS BEING DRIED UP AND USELESS.
W. S. Hill, photo.

sealed bags, of which four will go to the sack. An estimate as to the yield of lucerne-seed from Marlborough, based on a favourable harvest, is from 30,000 lb. to 40,000 lb. This will be sufficient to sow an area of from 2,500 to 3,000 acres.

The practice of feeding lucerne chaff to sheep during the winter months, as carried out by Messrs. Adams Bros., of Blenheim, is economical as well as being beneficial in maintaining soil-fertility. By means of self-feeders the sheep have lucerne chaff continuously before them, and the heavily stocked fields greatly benefit by the top-dressing of the animal manure.

The Marlborough opinion on lucerne may be best expressed by quoting the remarks of prominent farmers made during a

recent visit to the district. Here are a few of the opinions expressed :—

"Lucerne has stood to the farmer as nothing else has done during this season."

"Where 10 acres are in now 100 acres will be sown in the near future."

"Lucerne is the only thing that is doing."

"It is the king of all plants; there is nothing to compare with it."

"Lucerne has saved us this season."

"The only green colour to be seen for many miles is the hard-grazed lucerne."

The above remarks can be endorsed by almost every one having a thriving patch of lucerne.

This season lucerne is proving the salvation of many flocks and herds. It gives promise of becoming the leading fodder in this country for the production of fat stock and milk.

THE BLACKBERRY PEST.

"THE use of kerosene spray as a means of destroying blackberry has been tried with success in the Thames district," says Mr. F. R. Bould, Fields Inspector, who reports on the experiment as follows :—

"The manager of the Nicholls Estate (Mr. Harris) informed me that he has sprayed blackberry with kerosene, undiluted, with the very best results, the blackberry being completely destroyed, while the grass around about commenced to grow again after the first rain. Kerosene was first tried about eighteen months ago, and no blackberry has come again where the spraying was done. Mr. Harris says he is so satisfied with the results secured that he is obtaining a large consignment of kerosene to spray with this year. The cost is no doubt considerable, but the blackberry seems to be destroyed with the one spraying, thus saving further expense of cutting or spraying."

The oat crop at the Weraroa Experimental Farm is the best that has been harvested for a number of years. The wheat crop is also a very satisfactory one. Though the dry season in the North has necessarily affected the crops at the Ruakura Farm of Instruction, the oat crop promises to furnish a fair yield of grain.

QUINCE-STOCK V. PEAR-STOCK.

A. W. GREEN.

MUCH has of late been heard of the respective advantages and disadvantages of grafting pear-scions on to quince-stocks. This practice has been carried on to some extent, and, as it is a matter of some importance to growers of pears, a few remarks on the subject will be interesting and perhaps helpful to orchardists or others who intend cultivating this fruit.

There is a marked difference in the results obtained by the use of quince-stocks from those obtained when pear-stocks are used. The three accompanying photographs illustrate the great variation which may result from the choice of the two stocks when grafting young pear-trees. The first shows the trunk of an eight-year-old Directeur Hardy pear-tree grafted on to a quince-stock. The union of the pear with the quince can be clearly seen a short distance above the ground-level. It will be noticed that the scion has made almost as much growth as the stock. A deep longitudinal crack in the bark of the pear-trunk shows out prominently. Other cracks, though not so long but equally deep, occur on most of the large branches. This is not an exceptional case. There are nine other similar trees in the row, each of which has deep longitudinal cracks in the bark. Such cracking is therefore common with the variety Directeur Hardy when grafted on to a quince-stock.

Another influence which the quince has over the pear is to dwarf the tree and shorten its life. This is due to the weaker root-system produced by the quince as compared with that of the pear. The former makes more fibrous surface roots, but does not develop the large, strong tap-roots which characterize the growth of the latter. Thus the tree is not firmly rooted in the ground, and can be easily swayed about by the wind. The quince-stock has a still further effect on the pear: it forces the tree into bearing at an early age, which is of considerable value to any one desiring to grow a few trees in a garden, but this is not of so much importance to commercial orchardists.

GHT-YEAR-OLD DIRECTEUR HARDY PEAR-TREE GRAFTED ON TO A QUINCE-STOCK.

THE SAME TREE SHOWING THE CROP OF FRUIT PRODUCED LAST SEASON

EIGHT-YEAR-OLD DIRECTEUR HARDY PEAR-TREE GRAFTED ON TO A PEAR-STOCK.

The second photograph of the same tree shows the crop of fruit produced this season. This makes the third crop gathered, the weights of each being—

	lb.
First crop (1912)	53
Second crop (1913)	114
Third crop (1914)	146

The third photo shows the trunk of another tree of the same variety of pear grafted on to a pear-stock. This tree is also eight years old, and has been subjected to the same conditions in regard to cultivation, manuring, spraying, and pruning as the previously mentioned tree. The soil-conditions are also the same, this being the opposite tree in the next row, and a distance of 20 ft. away.

The union of the scion with the stock can be plainly seen. The stock has made greater growth than the scion, and, owing to its stronger root-system, has brought about results entirely opposite to those following the use of the quince-stock.

1. The bark of both trunk and branches exhibits no trace of crack.

2. The tree, instead of being dwarfed, is forced into strong, heavy growth. Even the leaves are larger and of a deeper green colour.

3. Its life is prolonged, and instead of failing when from fifteen to twenty years old, as will be the case with the quince-stock, it will be then reaching its fruitful age. It may be safe to conclude that large and old specimen pear-trees are on pear-stocks.

4. The tree at eight years of age has not borne a single fruit, nor has it as yet developed fruit-spurs to any extent, the whole of the strength being utilized in the formation of heavy wood, which is necessary to build up the framework of a large tree.

5. The tree is firmly anchored in the ground. The strong roots penetrate deeply into the soil, and, although they have to support a heavy top, there is little danger of the tree being blown over.

It may be mentioned before concluding that all varieties of pears will not give the same results as these obtained from Directeur Hardy. The habit of growth, vigour, and fruiting-qualities vary to such an extent with the different varieties that seldom do two varieties behave alike when grafted on to similar stocks. It has consequently been a study for professional nurserymen to determine which stocks are best suited to the various kinds of pears. The class of soil on which the tree is eventually to be planted plays an important part in the choice of the stock.

LINSEED-OIL CAKE.

T. W. LONSDALE.

LINSEED-OIL cake for stock-feeding, although extensively used in some countries, and especially in Britain, is, comparatively speaking, unknown in the Dominion. It is the product of flax-seed (*Linum usitatissimum*), which at present is the leading oil-bearing plant in New Zealand.

Although endowed with a climate suited to the production of linseed, and in many parts ideal land on which to grow this crop, the area at present devoted to the cultivation of linseed in this country is very limited. This may be owing to the fact that other crops for which there is always a ready market have hitherto been profitably grown, while there has been no immediate demand for linseed.

The great linseed-producing countries are North and South America, Russia, and India, Turkey and Morocco supplying smaller amounts. The United Kingdom, which manufactures and also uses an enormous quantity of linseed cake for stock-feeding, produces very little of the raw material.

Linseed cake is the by-product of linseed, and of all the purchased foods used on the farms of Britain there is none more general or more highly esteemed. It is recognized as a most useful food for all classes of stock, being especially valuable for fattening purposes. It can be safely fed to both young and mature stock, and the writer, who was for a considerable number of years connected with one of the principal herds in England, has fed linseed cake in quantities varying from ½ lb. per head for young calves to 8 lb. per head for mature cattle.

The methods of manufacturing linseed cake vary slightly, and in America there are two systems, known as old process and new process. In the first case the crushed seed is heated and placed between cloths or in sacks, which are piled one on another, the mass being then subjected to hydraulic pressure, which extracts the oil. The residue, after pressure and stripped of the wrappings, appears as hard slabs or cakes, about 1 in. thick by 1 ft. in width and 2 ft. in length. In this form the cake is exported.

In the manufacture of new-process oil cake, according to Woll, the seed is crushed and heated to 165° F., as in the production of old-process meal. The crushed mass, while warm, is placed in large vertical cylinders or percolators, and over it naphtha, a volatile petroleum compound, is poured and allowed to drain out at the bottom of the cylinder. Naphtha dissolves the oil from the ground flax-seed, being repeatedly added until nearly all the oil is extracted. After this has been accomplished steam is introduced into the percolator, and the naphtha which did not drain off is gradually driven out of the mass as vapour. This is so effectively done that no smell of naphtha is noticeable in the residue. This process has, however, in recent years gone out of use so far as linseed is concerned, though it is extensively employed as regards other oil-bearing seeds. According to the pressure applied and the length of time this is continued, the quantity of oil left in the cake may be regulated. The feeding-properties of cake depend mainly upon the oil and albuminoids it contains, and the following analyses may be taken as fairly representative of the principal classes imported into Britain. (From the "Standard Encyclopedia of Modern Agriculture.")

——	Calcutta.	Russian.	Argentine (La Plata).
	Per Cent.	Per Cent.	Per Cent.
Moisture	8·0	9·5	8·5
Oil	39·0	33·0	37·0
Albuminous compounds	21·0	23·0	22·5
Mucilage, digestible fibre, &c. ..	20·5	24·0	21·5
Woody fibre	7·0	6·5	6·5
Mineral matter (ash)	4·5	4·0	4·0
	100·0	100·0	100·0
Containing nitrogen	3·4	3·7	3·6

Professor Henry, in "Feeds and Feeding," gives the following digestible nutrients and fertilizing constituents of linseed cake manufactured by the old process:—

Dry Matter.	Digestible Nutrients.			Fertilizing Constituents.		
	Protein.	Carbo-hydrates.	Ether Extracts.	Nitrogen.	Phosphoric Acid.	Potash.
Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
90·8	29·3	32·7	7·0	54·3	16·6	13·7

Apart from the great feeding-value of linseed cake, it stands high in the table of unexhausted manure-values. According to Voelcker and Ball, Rothamstead, the residual value for each ton

of linseed consumed on the farm is given as follows from the first year after consumption onwards :—

	£	s.	d.
First year	1	10	6
Second year	0	15	3
Third year	0	7	7
Fourth year	0	3	9

Although it may be some years before the use of linseed cake for stock-feeding increases to any extent in the Dominion, older countries will continue to be consumers, and there is not much fear of the supply ever exceeding the demand. The question of manufacture, however, will always be ruled by the quantity of linseed grown. If extensively cultivated, there is no reason why the manufacturing of linseed cake should not become one of the industries of the Dominion.

In conclusion, a few hints will be useful to those who contemplate taking up the cultivation of flax. On farms where a rotation of crops is followed flax may take its place in the rotation, but on no account should it be grown on the same land more frequently than once in four years. In some countries a longer interval is allowed, as it is claimed that the plant is susceptible to disease, which does not appear when grown on new and clean land. By new land I mean land on which other crops have been grown subsequently to the previous flax crop.

Silage.—It is in a season like the present, when grass and crops alike have failed in many parts, that the great value of silage—that permanent insurance policy against drought—is brought home to us. By enabling the surplus of a favourable season to be held over in the best condition for a subsequent unfavourable period silage equalizes the seasons and makes the farmer practically independent of adverse weather-conditions.—*W. Dibble.*

Isolated instances in districts which have experienced long spells of dry weather this season have demonstrated the wisdom of the repeated advice given in these pages that green-manuring is a valuable means of retaining moisture in the soil (provided, of course, the top soil has not been neglected). Where the land has been deeply cultivated and green material buried or turned in excellent growth has been secured in localities where pastures and crops have absolutely failed. The instances in question have occurred generally in gardens, but the lesson is there all the same.

SEMI-OFFICIAL TESTING.

SOME RESULTS FROM THE YEAR 1914.

W. M. SINGLETON.

In the January issue of the *Journal* there were published the records of the latest certificates granted to purebred dairy cows for the testing-year of 1914. The year's work forms a pleasing retrospect, and the support given this movement by the breeders of purebred dairy stock has been most encouraging to all who have been connected therewith. From the viewpoint of the Department the work of the breeders has, as a whole, been very satisfactory. It has been found necessary to take little exception to any of the weights of milk forwarded, the great majority of breeders having forwarded entirely satisfactory records.

From the breeders' viewpoint it would seem that the testing is being conducted in a satisfactory manner. The letters received from them have been most encouraging. The secretaries of the various Breeders' Associations concerned have always been willing to afford us any assistance they could, and their helpful suggestions and enthusiastic co-operation have been much appreciated.

DUCHESS OF DELHURST, THE BEST THREE-YEAR-OLD HOLSTEIN, HER RECORD BEING 18,485·50 LB. OF MILK AND 615·85 LB. OF FAT. OWNED BY MR. W. I. LOVELOCK, PALMERSTON NORTH.

During the past year we have issued certificates of the performance of 188 cows, as compared with the issue of 115 certificates for the previous year. Those certificates granted in 1914 went to 104 Jerseys, 67 Holsteins, and 17 Ayrshires. The corresponding figures for 1913 were 67 Jerseys and 48 Holsteins. It will be noticed that the Ayrshires have been receiving certificates for only 1914.

Besides issuing certificates to 188 cows during the past year, there have been granted 14 to Jerseys and 11 to Holsteins which received certificates during 1913 and which were retested in 1914.

In the December number of the Department's *Journal* we published a list of leaders in the several classes as they stood at the end of the first year (1913), and also a corresponding list at the end of November, 1914. At the end of December only one change is necessary—viz., in the class for three-year-old Jerseys Mr. A. E. Wilkinson's Pepper is replaced as leader by Mr. F. E. Hellyer's Lady of Collingwood with 603·05 lb. butter-fat.

During our first year sixty-two breeders had cows on test, while in 1914 the number had increased to ninety. Breeders have recognized that advertising the records of their purebred cows is the most effective method of pursuing that phase of the breeder's business. This recognition is the explanation of the 50-per-cent. increase in our membership this year.

PRODUCTION OF VARIOUS CLASSES.

The Jerseys have received the largest number of certificates during both years of test. Below is shown a comparison of the average yield in the different classes for the two consecutive years. It will be noticed that amongst the Jerseys and Holsteins all classes evidenced an increased production in 1914 over that of the preceding year.

The results of the Jersey classes are as follow:—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
		1913.	lb.	lb.
Two-year	19	307	5,997·40	325·14
Three-year	17	311	6,964·58	379·61
Four-year	11	322	7,178·53	391·65
Mature	20	317	7,516·59	413·42
		1914.		
Two-year	36	333	6,090·34	335·46
Three-year	22	332	7,616·71	412·09
Four-year	12	323	7,064·08	398·71
Mature	48	338	8 737·31	471·15

It is encouraging that during 1914 both Jerseys and Holsteins are represented in all classes in greater numbers than was the case in 1913. This fact makes the increase in production for the respective classes all the more creditable.

The Holstein figures are as follow :—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
		1913.	lb.	lb.
Two-year	13	335	9,403·5	336·67
Three-year	14	325	11,732·0	415·70
Four-year	4	318	10,565·9	379·84
Mature	17	328	12,356·2	431·90
		1914.		
Two-year	25	344	11,213·12	400·90
Three-year	21	332	13,244·80	457·55
Four-year	8	325	13,077·37	441·25
Mature	24	322	13,404·21	482·14

This is the first yearly summary in which the Ayrshires are included. If comparisons must be made the figures indicated for this breed should be compared with the first year's productions of the other breeds—that is to say, the 1913 figures. Such a comparison should encourage greater support to this yearly testing at the hands of the Ayrshire breeders. The number of cows entered would tend to suggest that the Ayrshire breeders have been rather "timid" in this connection.

The Ayrshire figures are as follow :—

1914.

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
			lb.	lb.
Two-year	7	304	7,822·17	312·70
Three-year	4	322	8,595·30	341·44
Four-year	2	332	9,568·80	380·60
Mature	4	353	10,710·47	443·87

THE PRODUCTION OF THE VARIOUS CLASSES COLLECTIVELY.

This collection of Jerseys, Holsteins, and Ayrshires, numbering some 213 cows and heifers, including the 25 which were in test for the second consecutive season, gave an average production of 419·56 lb. butter-fat in 332 days. There is little variation in

the average length of lactation-period of the different ages, as the following table will indicate:—

Class.	Number of Animals.	Average Yield.	Days Empty.	Gestation-period.	Time between Calvings.	Days Milking on Test.	Days between End of Test and Calving.
		lb. Fat.			Yr. Dys.		
Two-year ..	68	357·18	91	282	1 8	334	39
Three-year ..	47	426·38	95	282	1 12	331	46
Four-year ..	22	412·53	91	282	1 8	324	49
Mature	76	473·18	106	282	1 23	334	54

LENGTH OF MILKING-PERIOD.

Without exception, the average number of days in milk of these several classes does not exceed eleven months. While some of our highest individual records are the result of a full year's milking-period, the average yields quoted above represent a milking-period very little longer than that usually attempted in modern dairy practice. Every one of the animals included in this average and which was over four years of age had been milking the preceding season, and every cow, whether under or over four years, is milking or has milked during the season after the test.

LENGTH OF DAIRYMAN'S SEASON LITTLE AFFECTED.

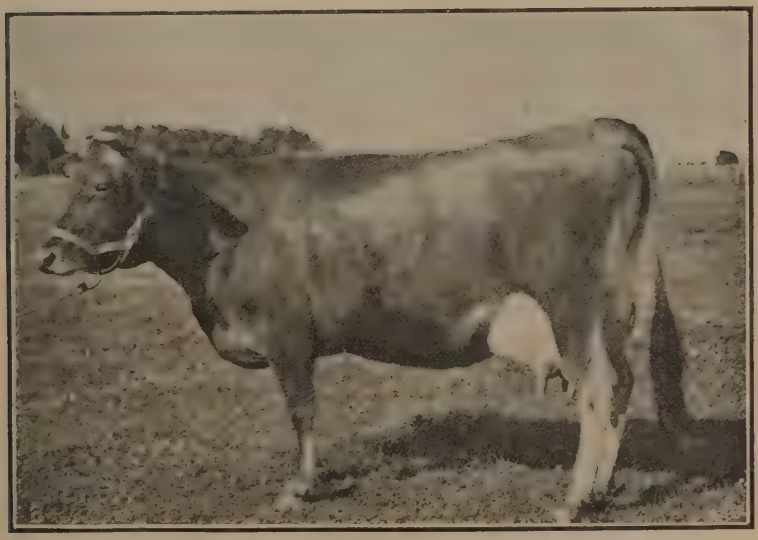
The rules governing the yearly testing of our purebred dairy cattle permit a period of 455 days from the date of commencement of test until subsequent calving. While this period may appear long, actual practice shows that breeders will not risk taking advantage of the final limit, excepting in cases where previous services to cows have been disappointing. It was for just such disappointments that the provision was made.

The average cow of the 213 which received certificates was empty after commencing the test for ninety-eight days. If we add to this the 282-day gestation-period allowed by the rules, the herd averages 380 days from calving to calving (or just fifteen days over twelve months), which is probably as near up-to-date dairy practice as should be expected. The average cow's testing-period and subsequent calving do not upset the ordinary dairyman's dairying season.

PERIOD OF REST STILL ASSURED.

The number of days which the average cow of the various classes was dry is also found to conform with good average work.

THE BEST THREE-YEAR-OLD JERSEY, MR. F. E. HELLYER'S (DUNEDIN) LADY OF COLLINGWOOD. RECORD, 9,386·10 LB. OF MILK AND 603·05 LB. OF FAT.



THE BEST JERSEY IN THE FOUR-YEAR-OLD CLASS, CHARM, THE PROPERTY OF MR. F. S. MCRAE, PALMERSTON NORTH. RECORD, 9,980·10 LB. OF MILK AND 572·52 LB. OF FAT.

The table shows these periods as varying from thirty-nine to fifty-four days, or from about five and a half to almost eight weeks. These figures should be reassuring to those who considered that semi-official testing was demanding too much from the cow's constitution.

BUTTER-FAT RECORD PUREBRED DAIRY BULLS.

The up-to-date dairy-farmer will realize that at last he can select a breeder who is likely to be in a position to offer him the butter-fat record purebred dairy bull for which he has been looking. A little later we hope to issue a list of breeders who have

THE LEADER IN THE MATURE AYRSHIRE CLASS, FANCY IV. OF CAMBRIDGE. HER RECORD IS 11,686·50 LB. OF MILK AND 492·03 LB. OF FAT. OWNED BY MESSRS. WATT BROS., CAMBRIDGE.

won certificates; but in the meantime intending purchasers can obtain the necessary information by referring to the list of owners of cows whose names have been published from time to time in this *Journal* as having received certificates.

Some breeders may have been disappointed at the beginning of the present season in that there was not a greater demand for purebred bulls of the old special dairy breeds. The fact that a comparatively small number of Shorthorn bulls have been sold at very satisfactory prices has caused some who do not understand the position to conclude that as a dairy cow the Shorthorn is taking precedence of the Holstein, Jersey, and Ayrshire.

It must be remembered that two associations have recently been formed for breeders of milking or dairy Shorthorns. Members of these two associations are naturally anxious to secure bulls of such breeding as will enable the progeny of the Herd-book cows to be eligible for entry in their Herd-book. Only a few breeders have such bulls to offer, and competition has made prices comparatively high in the meantime. It is merely a matter of time until this demand of these new breeders will have been supplied, and only then will the Shorthorn be in actual com-

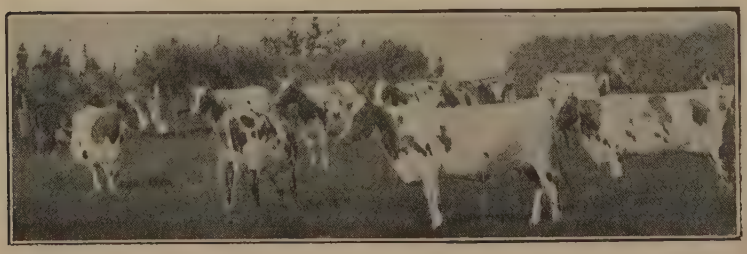
MISS RUSSELL, THE LEADER IN THE TWO-YEAR-OLD AYRSHIRE CLASS, WITH A RECORD OF 8,252·60 LB. OF MILK AND 365·84 LB. OF FAT. OWNED BY MESSRS. WEIR BROS., PUKEHIKI.

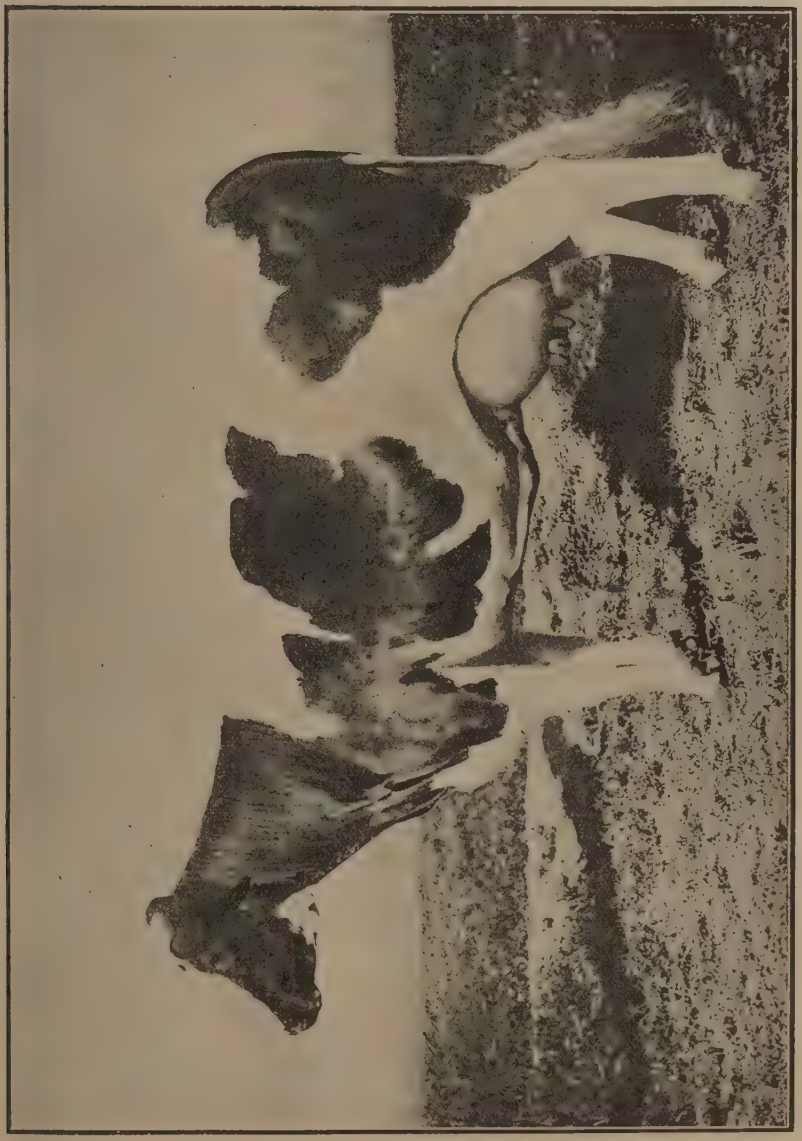
petition with the other dairy breeds mentioned. One of these associations has accepted the name of "Milking Shorthorn," and the other that of "Dairy Shorthorn." The Milking Shorthorn Association at Palmerston North has endorsed the semi-official yearly testing; and the Waikato Dairy Shorthorn Association has stipulated a certain minimum butter-fat standard for registration of females in their Herd-book. It would appear that both associations are likely to specialize on dairy lines without endeavouring to follow that illusion—"the dual purpose" animal.

It has been stated that in some counties in England the milking-quality of the non-pedigreed dual-purpose Shorthorn has been successfully developed. Writing of the breeders of these animals in these counties, the editor of the *London Farmer and Stock Breeder* states: "Breeders are beginning to fight shy of milk-records. The ostensible reason for this is that it would render accurate statements necessary with regard to the milk-producing capacity of dairy stock." After stating that in England the thousand-gallon cow is "rare," the editor concludes his article as follows: "The sooner that county milk-record schemes are put into operation, the more rapidly will the breeding of dairy cattle advance upon sensible lines." A dual-purpose Shorthorn of the "rare" variety yielding as much as 1,000 gallons testing 3·6 per cent. butter-fat would produce some 369 lb. butter-fat. Our mature cows, representing the three breeds on yearly test, averaged 473·18 lb. butter-fat for a lactation-period ending during 1914. It would appear that our milking and dairy Shorthorn associations have set their faces towards the light, and are not afraid to face the figures of butter-fat production, as the breeders of non-pedigreed dual-purposed Shorthorns are reported to be in England.

It is safe to state that in future no breed is likely to play a very important role in New Zealand dairying unless its partisans can show by way of yearly butter-fat records that the breed is worthy of propagation from a milk-producing viewpoint.

Testing the best cows in a herd has value only to breeders selling stock as an advertisement, but testing the whole herd is of the greatest value to all dairymen as an economical proposition; there are greater differences between the yield of individual cows of the same breed than between the average yield of different breeds.—*Hansen's Dairy Bulletin.*





THE WORLD'S CHAMPION MILK-PRODUCING COW, TILLY ALCARTRA.

A WORLD'S CHAMPION COW.

AMERICAN HOLSTEIN ESTABLISHES NEW MILK-RECORD.

TILLY ALCARTRA, a Californian Holstein, recently completed a twelve months' semi-official record which places her at the head of the milk-producing cows of the world. By the last San Francisco mail Mr. E. Clifton, New Zealand Trade Commissioner, forwards a photograph of the new champion. This is reproduced on the preceding page.

Tilly Alcartra's record in 365 days is 30,452·6 lb. of milk, containing 951·2 lb. of butter-fat. This is the first milk-record made under semi-official test to cross the 30,000 lb. line, although its butter-fat content does not approach the world's record. As a two-year-old this cow produced in semi-official test during 285 days a record of 14,837·2 lb. of milk, containing 444·96 lb. of fat; commencing again while just under three and a half years of age, she produced in 365 days 21,421·3 lb. of milk, containing 672·984 lb. of fat, and for a time held the world's record as the best junior two-year-old. Her third lactation season commenced at the age of five years one month, and it is during this lactation-period that she has gained the world's championship for milk-production. Tilly Alcartra is the granddaughter of the old foundation cow Alcartra Polkadot. The bull, Woodcrest Pietje Pontiac, which Mr. John Donald, of Westmere, Wanganui, imported a year since, is only two generations further removed from the same foundation cow.

Tilly Alcartra displaces as world's record milk-producer Creamelly Vale, which gave 29,591·4 lb.

During her testing-period Tilly Alcartra was stalled and milked four times a day. She was not allowed to run on pasture, but during the summer she had access night and day to a small piece of land for exercise.

The new champion is owned by A. W. Morris and Sons, Corporation, Woodland, California.

In Denmark, when the Association of Cattle-breeders was inaugurated for the purpose of improving the quality of the cattle by the use of selected bulls, it worked so well under the "control unions" that the average yield of butter from the "control union" cows in a comparatively short time exceeded by 33½ per cent. the yield of the ordinary cow of the country.—*Journal of the Royal Agricultural Society of England.*

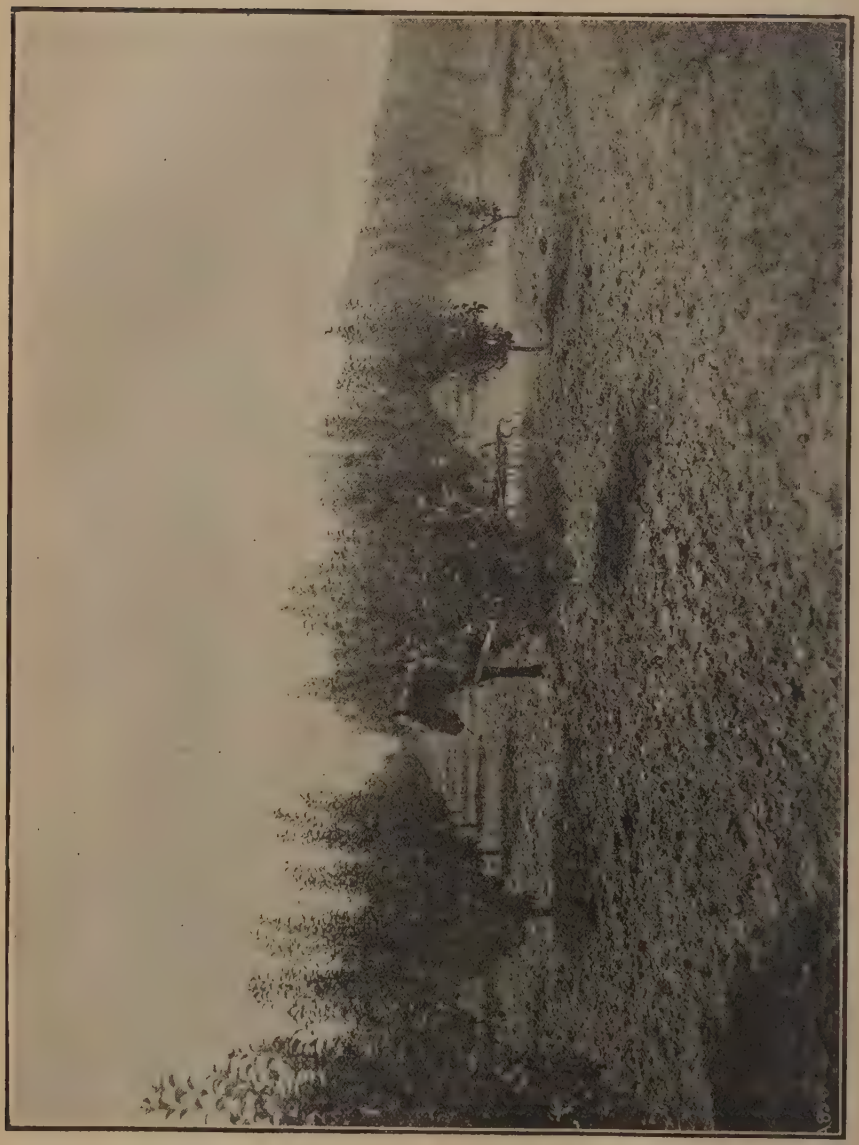
THE FRUIT INDUSTRY.

GOOD EXAMPLE FROM THE NELSON PROVINCE.

THERE is probably no phase of rural industry in this country which has been initiated with the same surety of ultimate success as the apple-growing movement in the Nelson Province. As a site for fruit-culture the new areas being developed are unsurpassed in the Dominion, comprising as they do rolling downs sloping gradually to the sea, and mainly with a northerly aspect. The climate is also suitable in a special degree, providing a maximum of sunshine with a fairly cold winter, and notable for an absence of winds. The soil favours the development of a richly coloured, a good-textured, and a well-flavoured apple. It is not what is usually regarded as a fertile medium for plant-growth, being a sandy clay, with little or no humus-content on the higher parts. It is the favourable aspect and the good climate which principally make the Moutere country so suitable for fruit-production, while the nature of the soil completes the combination as an ideal situation for apple-culture. It does not encourage, as do the richer soils, an excessive supply of sappy growth, so much appreciated by American blight. In its original state the land is covered with manuka scrub varying in character from heavy to a light growth. After this is cut and burnt the land is easily brought to a suitable condition for planting and subsequent cultivation, while little difficulty is presented in keeping the land clean and in good condition. It is not this combination of favouring circumstances making for successful establishment of fruit-growing that claims for the Moutere apple-growing campaign special consideration; rather it is the method by which the natural advantages of the country are being availed of. In the development of a rural industry to a high standard there are generally transition stages of a more or less lengthy duration through which it has to pass before it becomes established on a really profitable basis. A distinct contrast is provided by the Moutere apple movement. The country is being taken up principally by business and professional men in the cities, who have approached the matter from a sound commercial viewpoint. The land is being planted, under expert supervision,

MOUTERE LAND IN ITS ORIGINAL STATE.

SAME COUNTRY SHOWING FIRST, SECOND, AND THIRD YEAR TREES, WITH THE DEPARTMENT'S TESTING-ACRE IN THE FOREGROUND.



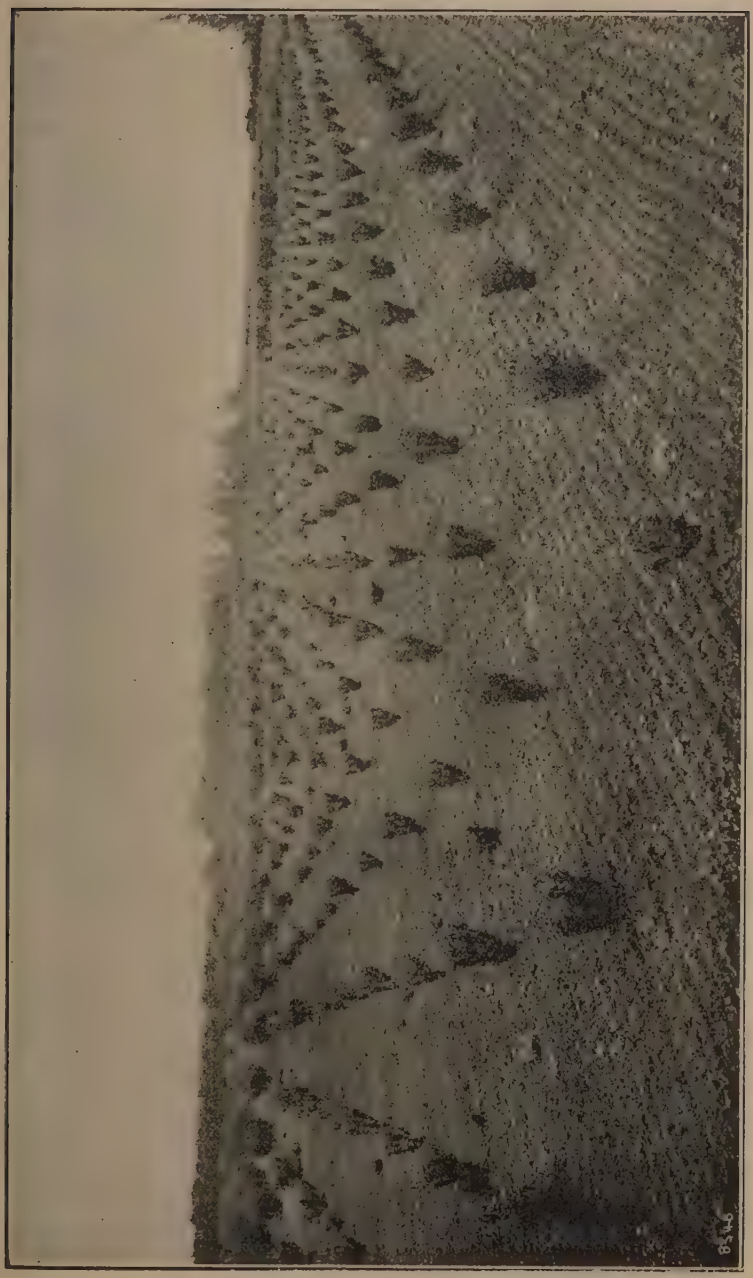
A FOUR-YEAR-OLD ORCHARD.

SPRAYING A YOUNG ORCHARD BY MEANS OF A MOTOR SPRAYER.

in an up-to-date manner with approved export varieties. In the majority of cases a number of blocks are in charge of an expert, who prepares the land, plants the trees, and maintains the orchards in a desirable condition by cultivating, spraying, and pruning, but in several instances large orchards are in charge of separate managers. Many of the orchards have been taken up by city people who intend to permanently settle on them when they are in full bearing.

A very assuring feature of the young industry is the fact that the work is being designed on the assumption that co-operation will play an important part when the profit-earning period is reached, especially in the grading, packing, and marketing phases of the business. The progressive pioneers have not provided grazing-areas for horses, usually regarded as necessary for working the orchard, for the reason that they intend to have the work of cultivation done by contract — and, maybe, the spraying in like manner — as well as the cartage of the fruit to market, or, rather, to the central grading-depot. It is in the minds of the moving spirits of the settlement that instead of each grower packing his fruit and sending it forward for shipment all the fruit will be sent in bulk to a central packing-depot, where it will be graded and packed according to the most approved methods. A grower, say, would send in 100 bushels of apples, 80 bushels of which may be graded A and 20 bushels B. When the returns come to hand he would be credited according to the value realized for the two grades. Under such a system it would be possible to cater to oversea buyers, who must have large uniform lines of high-grade fruit. Being shipped under one brand a sound connection could be established for the fruit on the great oversea markets. It will be seen that while apple-growing is being established under the most approved methods in a specially favourable environment the future conduct of the business will probably be controlled in a manner which must make for the most profitable returns.

It is not to be assumed that everything in connection with this instructive experiment is just as it should be. Difficulties were naturally met with in a work which developed to an unexpected magnitude. Sufficient experts to adequately superintend the big areas planted were difficult to obtain, and satisfactory trees, owing, no doubt, to the unprecedented demand on nurserymen, were not always available. While some sections are being improved by green-manuring, the building-up of the desired humus has been neglected in many areas. The comparative freedom of the district from winds is apparently leading large numbers of



A MOUTERE ORCHARD IN ITS SECOND YEAR AFTER CLEARING AND PLANTING

growers to neglect the important work of providing shelter, though some growers have proved that breakwinds may be rapidly established. There are considerable areas of the Moutere country, especially in the hinterland, which are unsuitable for fruit-trees, but are well adapted for growing such a tree as *Pinus radiata,* which in a couple of decades would provide a valuable timber asset and furnish the necessary timber for fruit-cases. Plantations on individual orchards would serve the dual purpose of furnishing fuel and some raw material for the co-operative sawmill and case-factory. A feature of some of the planted areas which strikes the visitor is the absence of provision for a pasture on which to graze a cow, while even the necessary space for keeping poultry and establishing a home garden has been overlooked. The specialized apple-farm is thoroughly modern in conception, but it is the business proposition of an absentee capitalist. To the man who intends making his living from this agreeable industry of the soil, as do the majority of those who have taken up land at Moutere, one of the great advantages of a country life—low cost of living—is lost if he confines his entire energy to the production of apples; while life in the country would be robbed of much of its pleasure were milk and cream not available, were apples the only fruit for family use, and should vegetables have to be purchased.

It has been declared that fruit-growing on the Moutere lands is only made possible by the liberal use of artificial manure. All the stimulation the trees have received in the majority of the orchards—and even in this particularly dry season they are presenting a very healthy appearance—is a handful of blood manure and a handful of bonemeal scattered above the root-system.

While it is not customary, or even desirable, to grow crops between the trees of the orchard, still, for those who desire to establish their own fruit-farms and make a livelihood off the land while the trees are developing, there are definite possibilities on Moutere country in the cultivation of berries and vegetables. One settler at least, Mr. C. H. Weyergang, has demonstrated that the Moutere land can produce particularly fine peas. The soil on which they were grown was dug over for the first time in the preceding winter. The land was limed, and the peas were fed once with sulphate of potash when the pods had set. Early peas, potatoes, and tomatoes have been supplied to the Wellington market by other growers, while strawberries of fine flavour have yielded well.

Some idea of the rapid extension of apple-growing in the Nelson district may be gained from the fact that during the past six years the new orchards planted represent 4,550 acres, or, roughly stated, 728,000 trees have been planted in that period. At the present

FOUR-YEAR-OLD APRICOT-TREES IN A MOUTERE ORCHARD.

time there are 8,511 acres in fruit in the Nelson district, representing about 1,361,760 trees.

Within a few years a prosperous community of primary producers should be peopling the apple lands of Nelson, contributing materially to the national wealth. A gratifying feature of this development-work is that an industry giving every promise of rich return for capital and effort is being established on land practically useless for any other purpose. While such an industry as dairying demands the use of the richest lands, here we have the poorer lands being made to produce a high return per acre and to carry a closer population than may be carried by any other rural industry.

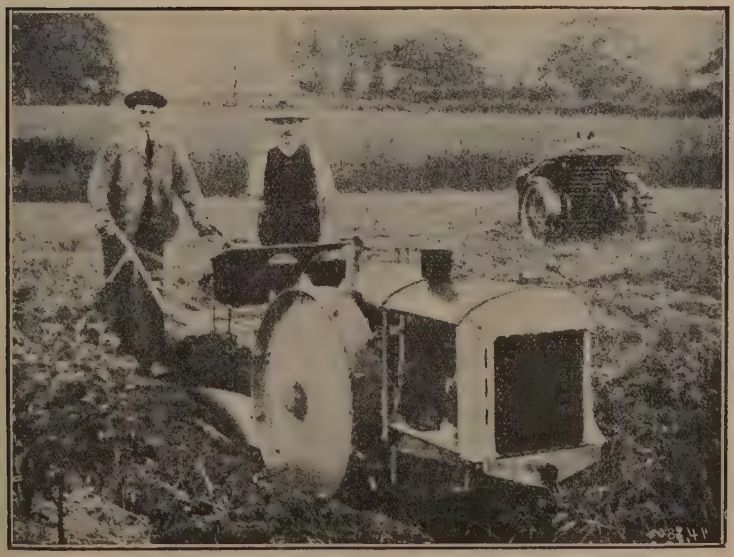
A MOTOR-PLOUGH.

IMPROVED MODELS OF THE WYLES.

ILLUSTRATIONS of the motor plough and cultivator — the Wyles motor-plough—being introduced in the Old Country by an English patentee have already appeared in the *Journal*. As keen interest is being taken by many readers in this invention, the latest information in regard to it and photographs of the latest models, taken from the *Implement and Machinery Review*, are here given. It appears that the machine is being made by two firms—the Wyles Motor Ploughs (Limited), 95 Carr Street, Manchester, and Messrs. John Fowler and Co. (Limited), of Leeds. In each case the price is £140, but for £3 3s. the former firm supplies a seat and steering-gear with their model.

The implement (says the *Review*) is fitted with a 9 b.h.p. petrol-engine situated in front of the two driving-wheels, the engine being governed to run at a constant speed, so that all the ploughman has to do is to start the engine and steer the plough. The steering, however, is almost automatic after the first furrow has been cut. With this implement about 3 acres can, it is claimed, be ploughed in a day of eight hours at a cost of from 3s. to 3s. 6d. per acre exclusive of labour, or from 4s. 6d. to 5s. including the wages of the ploughman, the depth of ploughing being "a little greater than that usually done by horses." The headlands are very small, owing to the ease with which the plough can be turned. By removing a draw-pin the plough bodies may be removed and cultivators or other implements substituted; whilst a pulley is provided for driving by means of a 3 in. belt all kinds of farm machinery.

THE WYLES PLOUGH AT WORK ON HEAVY LAND.



THE FOWLER-WYLES MOTOR-PLOUGH ON AN ESSEX FRUIT-FARM.

DAIRYING IN SWITZERLAND.

W. WRIGHT.*

THE buildings and equipment of the leading dairy concerns in Switzerland are of a thoroughly up-to-date character, and the manner in which they are maintained affords a striking object-lesson.

BERNA MILK COMPANY'S DRIED AND CONDENSED MILK FACTORY.

This company, with a capital of £80,000, has been in operation for some two years, with Mr. G. Kammerman as managing director. Mr. Kammerman was the original owner of the dried-milk factory which was formerly in operation at Steffesbourg, but which is now incorporated with the new company at Thoune. The buildings are substantially built in ferro-concrete, of two stories, with cellars and warehouses, and are equipped with the most modern technical appliances for converting milk into powder form, and also for condensing milk, both branches of the work being carried on all the year round. All the necessary tins and packages required for the despatch of the finished products are made on the premises by the most modern mechanical methods. A railway-siding connects the factory with the main line at Thoune. At the present time about 5,000 gallons are treated daily, but during the winter months the quantity falls to about one-half. The milk is delivered twice daily in summer and once daily in winter, and the price paid to the farmers ranges between 7¾d. and 9d. per gallon, according to the time of the year. After the milk is weighed into receiving-vats it is run through heaters, and the temperature of the milk is raised to 80° C. on its way to the large vacuum-pans, which have a capacity of about 1,300 gallons. While in the vacuum-pans the milk loses between 60 and 70 per cent. of its original water-content, the evaporation taking place at a temperature of about 65° C. Before being tinned the temperature of the condensed milk is brought as low as possible by water-cooling, artificial refrigeration not being used. About 14 per cent. sugar is used in the manufacture of condensed milk, but this is regulated by the fat-content of the milk. The vacuum-pans are also used

* New Zealand Dairy-produce Inspector, London.

for the manufacture of milk-powder. The condensed milk is fed through jets that throw the milk into a small trough in which small rollers are revolving and which are in contact with the main rollers, and by this means the liquid is fed to the large steam-heated rollers on which the work of evaporation is completed. After leaving the evaporating-machines the milk-powder is treated in the usual way, and then packed into 2 cwt. casks for transport.

SIMENTAL DAIRY HERD.

After leaving the milk company's premises a visit was paid to a dairy farm in the vicinity owned by Mr. Chr. Grossniklause. The number of the herd varies from eighty to one hundred animals, but at the time of my visit there were eighty head, including young stock and bulls. The average milk-yield of the cows of this herd is stated to be about 500 gallons, and the highest individual yield is 800 gallons. By judicious selection since 1882 the owner is gradually increasing the milk-producing capacity of his herd from year to year.

Milking is carried on at this farm all the year round, and the milk is sold wholesale for delivery in the Town of Thoune, and at the time of my visit the farmer was receiving 9½d. per gallon for the milk. The acreage of the farm itself is small, being only about 38 acres in extent, the rental being about £6 per acre per annum. During the summer months, however, the stock graze on the military exercising-grounds at Thoune, the grazing-charges for the season being £2 10s. for the cows, £2 1s. 8d. for full-grown heifers, £1 13s. 4d. for young heifers, and £1 6s. for the calves. The grazing-period is estimated to be from the 20th May to the 20th September. The farm itself is reserved for cultivation purposes, which include the growing of the necessary hay, root, and corn crops for the stock that are stabled during the winter months. Winter feed for the stock consists chiefly of hay and oat rations. There were six bulls at the time of my visit, and the owner valued a four-year-old at about £240, and the values of his cows ranged from £30 to £120. For breeding purposes the heifers are put to the bull at from two years to two years and a half. Cows are milked up to twelve and as high as fifteen years of age. All cattle are submitted to the tuberculin test before being sold. About eight years ago it was stated that 10 per cent. of this herd was more or less tubercular. Milkers here average about eight cows apiece at each milking, and do the necessary feeding of stock and all farm-work, the wages being from 10s. to 12s. 6d. per week, with board.

Electricity appears to be universal throughout this country for lighting and power purposes, the current being generated by water-driven turbines. Practically all the farm buildings are fitted with electricity, particularly as a lighting agent.

At this point it might not be out of place to make mention of the unfavourable impression made upon my mind by the very insanitary state of the cow-sheds that I visited. Such a state of things exists here to-day in badly lighted and poorly constructed buildings that would not be tolerated in the Dominion. In such a progressive country as Switzerland a visitor is filled with wonder at the fact that such a condition of things has been allowed to exist for so long. Were it not for the summer visits of the Swiss cattle to the alpine pastures each year, where the animals enjoy some months in a pure and health-giving atmosphere, the general health of the cattle would be much more seriously affected than it is under existing conditions. It is, in the writer's opinion, a very weak spot in the dairy system of that country, and one that requires immediate and earnest attention on the part of those interested.

CO-OPERATIVE CHEESE-EXPORT STORE AT ZOLLIKOFEN.

At Zollikofen, not far from the dairy school, is to be found the premises of the Emmental Swiss Cheese Export Company, founded on the 20th August, 1911, by the Swiss co-operative dairy companies. It has a capital of about £80,000. The object of forming the company is to secure up-to-date storage-room for the proper ripening of the cheese, and also to be able to regulate the supply of cheese for marketing purposes. The company purchase the cheese outright from the producers, and sell it on their own account. They have also a store at Gossau, which is of older date, having been erected in 1905. The company have storage accommodation for a stock of about 12,000 Emmental cheese should circumstances require it. The cellars or curing-rooms are fitted according to modern requirements. The head office of the company is at Zollikofen. They have also a selling agency in Paris, and have representatives in most of the large centres of Europe and other parts of the world where the consumption of Emmental cheese is in favour. The overseas exportation amounts to two-fifths of the total cheese exported. The business transactions last year amounted to about £360,000. In addition to Emmental cheese, the Gruyere and Tilsit varieties are also dealt with. Gruyere is really Emmental cheese of a somewhat smaller size, with the same characteristic gas-formations. Tilsit is of quite a different type, being similar in size and shape to Caerphilly. The Gruyere is generally made in

the higher country or alps; and no doubt the size of the cheese has been modified to allow of easier transport over the rough country. At the time of my visit the approximate values of these cheese were: Emmental, 10d. per pound; Tilsit and Gruyere, 9d. per pound wholesale. The company make their own packages for the despatch of the cheese to the different parts of the world. For the European trade two cheese of about 115 to 120 kilos in weight are packed in each tub, with large scale-boards between each cheese. For the American trade, however, the usual custom is to pack four cheese in a tub similarly protected by the use of scale-boards. All cheese are branded with a hot iron before being packed for shipment.

A SWISS CHALET WHERE GRUYERE CHEESE IS MANUFACTURED.

AGRICULTURAL-RESEARCH LABORATORY, LIEBEFELDT.

The work carried on in this institution is entirely confined to research in dairy and agricultural problems, and at the time of my visit one specialist was engaged in making special studies of the diseases of bees, and, to enable the work to be carried out in its entirety, an apiary is established in the grounds attached to the laboratory.

The staff is under the direction of Professor Dr. R. Burri, and consists of five doctors or specialists in the bacteriological section, and four others who devote their time to problems in the chemical division of the laboratory.

The laboratory was built in 1902, at a cost of about £40,000, and is fitted up with all the latest appliances required for research-

work. One thing that attracts a visitor's attention immediately on entering any of the rooms is the electric controls fitted up to regulate the temperatures of the various appliances during the time they are in operation.

A most important feature in the work of this institution is the preparation of the necessary pure cultures for making the Swiss Emmental cheese. One man is specially engaged in this work. Pure cultures of *Bacillus casei epsilon* are prepared and sent out fortnightly to the various factories, at a cost of 1 fr. (or 10d.) to the buyer, thus enabling cheese to be turned out from numbers of factories uniform in quality. If it were possible for this class of work to be dealt with in connection with the laboratory at Wallaceville, by which means pure lactic-acid cultures could be supplied to the various creameries and cheese-factories throughout the Dominion at regular intervals, it would, I believe, prove a great boon to the dairy industry by assisting toward a uniformity of the quality of dairy-produce that is so desirable.

The laboratory is situated on a farm of some acres in extent, upon which are established grass-growing experimental plots, a dairy of sixteen cows, and a cheese-factory, all of which are in conjunction with the research-work of the laboratory.

It was my privilege to spend part of a day in the cheese-factory mentioned above, where I, in company with Dr. Broderick-Pitard, of the laboratory, witnessed the method of manufacture of Emmental cheese, the making of which is carried on all the year round.

THE MANUFACTURE OF EMMENTAL CHEESE.

Emmental cheese is a type of cheese quite distinct from the Cheddar variety in so far that the aim of the maker is to turn out a cheese well honeycombed with large round gas-holes. To allow the *Bacillus casei epsilon* to do its work, it is essential that there should be a minimum of lactic-forming bacteria present.

The cheesemaking-vats are circular in shape, with a concave bottom. The lining is of copper, which is not tinned, and many of the outer jackets are of wood, others being of cast iron. All are fitted with either hot-water or steam fittings for the purpose of heating the milk. I saw some vats with a capacity of about 500 gallons. The cost is 1,200 fr. (£50), and it is estimated that a vat of this kind will last for thirty years in daily use.

The presses are vertical, with one press for each cheese. If a factory is turning out two or three cheese per day it is necessary to have two or three presses accordingly. The time that the cheese is in the press is about twenty-four hours.

It is estimated that it takes from 11½ to 12 lb. of milk to make 1 lb. of cheese, the age of the cheese at the time of weighing being nine weeks.

The rennet supplied to the Swiss cheesemakers is not in liquid form, but is in the solid, being sections of the calves' stomachs specially prepared. To prepare the rennet for cheesemaking the cheesemaker places a quantity of the rennet in a stone jar, adding sufficient water. The jar, with its contents, are then placed in an incubator overnight and held at a temperature of 28° to 30° Celsius (Centigrade), and the resultant liquid is then used the following morning for coagulation purposes.

The milk-supply is obtained from the dairy-herd, and is supplemented by a regular supply of milk from a farm near at hand. Samples of the milk are taken daily in sterilized tubes on delivery at the factory, which are then plugged with cotton-wool and held for observation purposes, bacteriological and otherwise. The rennet test is used for determining the condition of the milk in the proportion of one of rennet to eight of milk. On the occasion of my visit 500 litres of milk were used for cheesemaking. This was the fresh milk delivered that morning, to which was added a quantity of milk that had been received the night previous, the night milk having been set in pans overnight and skimmed in the morning before being added to the new milk, so as to reduce the fat-content of the whole of the milk used.

I might mention here that the cows of the Liebefeldt herd are milked with the Amo milking-machine, and this machine is doing good work. But the use of milking-machines does not find favour with the Swiss cheesemakers, on account of the high undesirable bacteria-content that is found in milk that has been drawn from the cows by this method.

The rennet test showing that the milk coagulated in 35 seconds, rennet in the proportion of 1 to 300 was added to the vat of milk, the pure culture having been added previously to the rennet. The temperature of the milk at the time of setting was 34° Celsius; the curd was then cut into cubes, coagulation being sufficiently firm in twenty-four minutes. 32° Celsius is recognized as being the proper temperature. A temperature of 50° Celsius was maintained while cooking the curd, the stirring being done mechanically. When the curd is sufficiently cooked it is removed from the whey and placed in the cheese-press.

After the curd has been removed from the whey, the latter is heated up to 80° Celsius, and is then run through a separator to skim off the butter-fat. The cream is then cooled down for buttermaking. A lactic-acid whey-starter is added to the whey

before it goes through the separator. The cream obtained from the whey is then added to that obtained by hand-skimming, and the whole is churned the following morning. After the cheese has been removed from the press it is placed in brine for two days, after which it is placed in a cellar at a temperature of 10° to 12° Celsius for about eleven to fourteen days. The cheese is turned every two days, salted, and cleaned (no salt is added to the curd before being hooped). The cheese is then removed to the curing-room, where it is kept for about nine weeks at a temperature of 20° Celsius, to bring about the formation of the gas-holes peculiar to this class of cheese.

BREEDING-FARM FOR SIMENTAL CATTLE, FLAMATT.

The next excursion was made with the object of visiting a breeding-farm for purebred Simental cattle, which is owned and

THE HERD AND HOMESTEAD OF MR. F. MARBACH.

occupied by Mr Marbach, at Grossried, near Flamatt (Fribourg Canton). *En route* to the farm a co-operative cheese-factory was inspected at Laupen. The estate of Mr. Marbach is situated at an altitude of about 2,000 ft., and includes an area of about 173 acres. His herd consists of ten bulls, fifty-five cows, and thirty-five heifers and calves. Most of the milk is used for rearing the young stock, the remainder being turned into cheese. The average milk-yield for this herd of cows is about 8,900 lb., the highest individual yield being 9,240 lb. These figures are taken from the records of the cows' milk-yield that are under

test by an official tester. The cows are stall-fed all the year round.

For some years Mr. Marbach has made it a practice to send his stock up into the high country during the summer season, and the results have generally been found to be satisfactory. This gentleman enjoys a good name as a breeder, and his successes are well known in Switzerland and abroad. Every year he raises some thirty-five to forty head of purebred stock.

In the herd-book of the Schmitten breeding syndicates of Switzerland, of which Mr. Macbach is an active member, there are registered some fifty-five cows that are to be found in his herd at the present time.

This estate is very intensively worked. Besides 100 head of cattle there are eight draught horses and one stud horse, and also from thirty to fifty pigs, which are of the German type. There are also five sows and two boars kept for breeding purposes. All the corn crops as well as all the potatoes grown on this farm are used for fodder for the stock, in addition to which 20 tons of oats and 5 tons of roots are purchased annually for the same purpose.

In addition to the farmyard and liquid manure used, about 15 tons of Thomas's phosphate, 5 tons kainit, and 2½ tons of bonedust are used yearly. There are eight farm labourers, including the milkers, kept on this farm. The owner supplies lodgings for the married men and their families, and their children above a certain age assist in the work of haymaking, harvesting, &c.

Milkers in the Berne Canton can command from 16s. 8d. to 18s. 4d. per week, with board and lodging, but wages appear to vary considerably in the different cantons. They have also to attend to the feeding of the stock.

The cow and the acre are the twins of the dairy farm and must both be treated fairly. Both must earn their keep. Each helps the other when properly trained together. If one is poor it robs the other.—*Hoard's Dairyman.*

Breeders of dairy cattle should note "the writing on the wall." The Danish live-stock law of 1912 ordains that two years from its enactment Government subsidies for premiums at shows will not be granted for bulls of dairy breeds unless reliable information is given as to the yield and fat-percentage of their mothers; and five years from its date no subsidies will be given for cows unless reliable information is given as to their yield and the fat-percentage in their milk. This proves that the authorities have faith in the work of the cow-testing associations.—*Hansen's Dairy Bulletin.*

THE SILO.

AN IMPROVED FORM OF THE ALL-STEEL SYSTEM.

THE great value of silage for ensuring a supply of succulent fodder in the drier months of the year and in winter, and especially as a stand-by in prolonged periods of dry weather, is being appreciated by an increasing number of farmers. The stack form appeals to many where labour is difficult to secure, but the permanent or the movable silo, in which a better and more economical silage can be stored, is coming to be recognized as a prudent investment. In Australia the all-steel silo is proving very popular. Recognizing the value of it for New Zealand conditions, the ensilage expert of the Department, Mr. W. Dibble, has invented an improved form. This has now reached the final stage of development, and is being manufactured by Messrs. Harvey and Sons, of Auckland. Farmers interested in the subject will shortly have an opportunity of investigating this improved all-steel silo for themselves. The first sections of the steel plates are bolted on to a concrete foundation; but the chief improvement in the New Zealand over the Australian model is in the provision of a properly constructed steel roof, which is so made that it can be raised at will to increase the carrying-capacity of the silo, while it can also be made to serve the purpose of automatically applying weight to the silage. When the roof falls into position the silo is made airtight, but by the provision of a ventilator (which can be opened or closed from any position) fresh air can be admitted when the work of removing the silage is in operation.

The advantages of the all-steel silo over other styles are obvious. It is effective for many years, and can be moved to another position if desired: this while the wooden-stave silo has a short life and is often unsatisfactory—having to carry the heavy packed silage in winter and being often empty in dry weather—and while the concrete silo is expensive and is an absolute fixture. Again, the all-steel silo can be used for other storage purposes—to hold grain, &c.—and by reason of its mobility can be removed to suitable sites for such purposes.

Being able to dismantle and erect the silo at any part of the farm means a considerable saving in the cartage of the green material to

the silo, and enables the work of making the silage to be carried out much more expeditiously. One of the chief advantages of the portable silo is that in placing it in one of the fields at the back of the farm—fields which are invariably less fertile than those around the homestead—the feeding-out of the silage to the stock has a tendency to automatically enrich the soil and thereby maintain its fertility without the necessity of purchasing and applying expensive artificial fertilizers. The usual position for a silo on a dairy farm is attached to the milking-shed. Thus all the animal manure is concentrated near the buildings. This invariably means that it is wasted, for it seldom gets back to where the silage material was grown. It accumulates near the buildings, and too often much of the virtue leaches out. If it is spread on the land, this is too often done on the adjacent fields, which probably have humus enough, but rather require lime and phosphatic manures. Not only is the concentration of the manure at the milking-shed an economic mistake, unless, of course, the manure is properly conserved and carted out to the fields mostly in need of it, but the feeding of the stock in the shed—of course, in some districts it is necessary to stall-feed—means that it is not easy to maintain the milking-premises in the desirable sanitary condition. Feeding the cows away from the milking-quarters largely prevents that dropping of the manure in the shed which renders the work of obtaining clean milk very difficult. Feeding the cows during milking-hours often makes them restless, and therefore less inclined to give down their milk well and completely. The quiet cow may not be affected, but the young heifer and the highly strung beast are sometimes made so unruly that their effective milking is interfered with, especially where an employee is doing the work.

In using the all-steel silo Mr. Dibble advises employing two medium silos (40 to 50 tons) rather than a single large silo (100 to 150 tons), as then one can be available for receiving any surplusage of a catch-crop which may not be immediately required. Thus what would otherwise be wasted may be converted into a food-supply which will be appreciated at some later date when pastures are dry and supplementary crops are not ready for use. To the farmer employing lucerne the fact that he has a spare silo ready to be filled should especially appeal, as the first cut of lucerne, or even subsequent cuts during a period unsuitable for haymaking, can be immediately preserved. Lucerne-growing and silage-making should go hand in hand. There is a certainty with lucerne and silage which is not provided by any other crop or system of feeding, and, with the general trend towards higher land-values and more valuable stock, greater certainty of a food-supply

at every season of the year becomes a vital essential in all classes of farming.

To gain the full benefits from silage a layer should be completely removed every day, so that fresh and palatable material may be always available. The removal of merely an inch or two would be sufficient. With a large silo this is not always easy unless a big number of stock is being fed.

The all-steel silo, having a coat of paint, is an attractive asset to the farm property, while as an insurance policy against weather adversity it should yet come to be recognized as an essential equipment of the up-to-date farm.

A VALUABLE SOILING-CROP.

W. DIBBLE.

SUCCULENT green feed is a valuable asset to the dairy-farmer in the autumn, winter, and early spring months. There is nothing better for this purpose than a mixture of Azof barley (1 bushel), tares (½ bushel), Italian rye-grass (20 lb.), and beans (15 lb.). As rapid maturity and a heavy growth are desired the crop should be stimulated by applying with the seed 1½ cwt. of bonemeal and 1½ cwt. of superphosphate per acre. Sown early in March the crop may be used to furnish a nice bite when pastures are probably failing at the end of the milking season, after which it could be allowed to develop into a crop for carting out to the cows in the late spring. The better method of utilizing the crop is to allow it to mature, which it should do, given fair growing-conditions, in July or August, when it could be cut and fed out to the cows just when they are in the greatest need of good food, having just gone through an exhausting milking season and about to bear a calf, though this need would be generally overlooked and the feed kept till the cows have calved. On light land the crop may be fed off with advantage, though on heavier lands the soiling method is preferable. The rye-grass will come away again and give, if desired, fair feeding in the spring months. I would prefer, however, to leave it and utilize the dense matted growth as green manure preparatory to establishing lucerne or for making a fine seed-bed for any other crop. On light land deficient in humus this procedure would be most advisable, as the crop furnishes a great body of humus-forming material.

TOMATO-CULTIVATION UNDER GLASS.

A SOUTHERN EXPERIENCE.

A SOUTH CANTERBURY reader, Mr. J. G. Paterson, of Timaru, communicates the following interesting note on tomato-growing under glass :—

In various articles in your pages recording experiments for the control of diseases met with in the cultivation of the tomato I have noticed time and again the great loss suffered through the ravages of eelworm, and that a cure simple and inexpensive would be a great boon to the industry. Two or three numbers ago I saw that your Department had been experimenting with "Matadoleo," but that more trials would be required to be made before any definite results could be given. Having for three years now used Matadoleo to combat eelworms (from which I used to suffer very severely) with complete success, I take the liberty of sending you a short account of how I use it.

About the beginning of May, when the summer's crop has been secured and the greenhouse cleared, I mark out the ground every 3 ft. where the rows for the future crop are to be. I used to plant every 2 ft. between the rows, but having tried both ways I would not return to 2 ft. on any account. The advantages are—equal if not greater returns from one-third less plants, freedom from disease, more room for moving about among the plants, and space for boxes between the rows if you are raising large numbers of plants for sale or outdoor growing. I begin by taking out a trench at every mark, 12 in. or 14 in. wide, one spade deep (6 in. or 8 in.), then breaking up the bottom of the trench with the spade or pick, sprinkling a little Matadoleo on the loosened soil, and supplying what stable manure I am going to give. The bottom is forked over lightly and the trench is filled up with fresh soil. On top of this another sprinkling of Matadoleo is applied, and a mixture of superphosphate, lime, basic slag, and kainit. The whole is forked up together, and the ground is allowed to lie all winter. About a month before planting-time I give the whole ground a thorough soaking. It will then be in a fit state for setting out the plants. I water the plants in the usual way, and every six days or so I give a bucketful to every ten plants. When setting

out the plants I leave a saucer-like depression around each, to hold the water. When, say, a couple of trusses are set I give another thorough wetting, which does for three or four weeks and keeps the ground in a fit state for growth. About four of these waterings carry the crop right through the season. I never water overhead unless on a very hot day, and then never after midday. I may state that instead of using the hose direct I have a ½ in. copper pipe perforated with four rows of small holes fixed to the end of the hose. With this you can do two rows at once and go away and leave the water running for an hour or two without any fear of anything going wrong. I find this method of watering a great success and a saving of much labour.

I have used the Matadoleo for three crops, and have seen no trace of eelworm during that time. The crops have been good, and this year's is everything one could desire. I may also mention that Matadoleo appears to be a cure for sleeping sickness. Before I used it this disease was too common to be agreeable; now there is never more than a few plants affected with that or anything else—say, 1 or 2 per cent. So far I have never put any Matadoleo in the ground between the rows.

The house is 100 ft. by 25 ft. I used two tins, costing 12s.—about 24 lb. I also treat the soil for raising plants with Matadoleo.

Lucerne at Moumahaki.—There are 50 acres under lucerne at the Moumahaki Experimental Farm, while 120 tons of lucerne hay are in stack, and it is estimated there are 30 tons of hay yet to harvest.

As a result of experiments the specialists of the United States Department of Agriculture have discovered that a small amount of ordinary borax sprinkled daily on manure will effectively prevent the breeding of typhoid or house-fly. Similarly, the same substance applied to garbage, refuse, open toilets, damp floors, and crevices in stables, cellars, or markets, will prevent fly-eggs from hatching. Borax will not kill the adult fly, nor prevent it from laying eggs, but its thorough use will prevent any further breeding.

A subscriber writes, "A man is a fool to cart out green stuff to his cows when he can have silage. I used to feed green crops, cutting the material every day and carting it to the cows. Now I put all my green stuff into a silo—which takes only a few days—and I have a continuous supply of good feed without having to go out every day in all weathers to cut it. The silage saves the daily labour, while the land is unlocked and can be used for grazing or for growing some other crop."

THE RAINFALL IN 1914.

D. C. BATES.*

THE year 1914 will long be remembered as one of the most trying ever experienced by the farmers and pastoralists of New Zealand. The winter months (June, July, and August) proved mild, and the rainfall, compared with the averages for previous years, was generally deficient. This dry season was followed by an exceptionally dry spring, but added to this was a summer in which greater quantities of rain were much needed. Though "absolute droughts," in a technical sense, were rare, and absolute minimum monthly rainfalls were not made in any long records of stations, such a continuation of dry conditions was distressing, and such a succession of dry seasons had not previously been regarded as possible in the Dominion. Month after month the total rainfalls were below the averages for the month in previous years in most parts of the Dominion, but it is remarkable that in Southland conditions were almost reversed, and heavy and frequent rains were there experienced during the year. In the South Island the monthly means for previous years show a fairly even distribution of rainfall throughout the whole year; but winter is the rainy season of the North Island. Such was not the experience in 1914, and the leading meteorological feature which accounts for it is the absence of ex-tropical disturbances of a cyclonic character and a counterbalancing prevalence of "brave" westerly winds which held sway during the greater part of the dry period.

Occasionally while Australia has a "dry time" New Zealand has abundant rainfalls, but both suffered in 1914, and it is noticeable that reports from England and France indicate that a somewhat similar and remarkable succession of months of deficient rainfall was experienced in other parts—in England and France at least. Other regions may also disclose irregularities in the precipitation of the world, and when these can be properly compared and studied it is possible that men may recognize reciprocal relationships and trace common cosmical causes which are as yet unknown.

Scattered over the globe are thousands of observers who carefully and patiently, and in the vast majority of cases voluntarily, record the rainfall of their neighbourhoods. The cumulative results of their humble devotion to science must undoubtedly prove of great value

* Director, Meteorological Office.

to their own immediate localities and the countries they inhabit, but the fruits of their observations may, it is hoped, reach a much higher appreciation in the future when more is known of the laws governing precipitation. Rainfall, it may be remarked, is now the least certain element, although the most important item in weather-forecast.

The following table has been computed to show the percentages of rainfall compared with the monthly means at select stations during the several months of the year in various parts of New Zealand :—

Place.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean (Months).		Total Rainfall for Year 1914.
													+	−	In.
North Island.															
Auckland	51	56	77	124	106	71	81	28	40	32	44	61	2	10	28·42
Te Aroha	39	35	137	149	59	45	55	29	25	25	37	69	2	10	31·98
Rotorua	22	56	69	145	49	62	70	18	44	27	24	53	1	11	29·70
Tauranga	28	26	110	188	42	35	42	9	31	23	16	48	2	10	30·66
Gisborne	22	59	176	90	236	56	14	80	19	23	36	9	2	10	38·71
Greenmeadows, Napier ..	14	62	111	101	137	6	4	38	14	8	56	21	3	9	22·12
New Plymouth	80	75	43	128	74	33	50	28	29	46	120	122	3	9	39·79
Moumahaki, Waverley ..	53	133	23	131	154	81	66	45	45	64	80	94	3	9	38·38
Palmerston North ..	120	78	34	140	130	63	54	57	34	51	95	124	4	8	33·22
Taihape	65	145	65	86	136	63	81	30	33	34	58	71	2	10	31·71
Masterton	56	91	67	133	151	76	26	33	41	18	62	78	2	10	28·17
Wellington	79	56	68	64	166	76	43	25	36	37	59	60	1	11	31·90
South Island.															
Hokitika	141	78	33	134	96	56	86	66	88	58	191	134	4	8	112·32
Nelson	36	112	54	171	110	75	91	18	9	17	*100	64	3	9	26·01
Christchurch	65	57	44	125	162	99	18	44	37	61	108	110	4	8	19·90
Lincoln	104	86	57	124	189	82	18	25	30	81	98	106	4	8	20·95
Timaru	149	159	107	90	125	28	13	54	8	33	113	65	5	7	17·99
Waimate	178	192	132	166	93	70	18	35	17	53	90	76	4	8	23·14
Dunedin	106	114	59	124	81	88	69	24	62	60	107	111	5	7	31·31
Gore	166	172	36	128	151	163	169	116	123	99	215	114	10	2	38·89
Invercargill	132	85	17	126	91	141	97	144	152	101	116	117	8	4	49·58

* Was a fraction below the mean.

On the 29th of last month a copious fall of rain was experienced at the Ruakura Farm of Instruction, practically the first good rain experienced for six months. Root and late forage crops will thus be saved.

A North of Auckland subscriber writes: "Fodder is very scarce and dear. Driving around the other day I only saw four or five small stacks of oats and two little haystacks, of about five or six tons each. In normal years there would have been hundreds of tons of hay in the same radius of country. No doubt the dry spell will do the land good, but, unfortunately, no one was prepared for it. The experience is providing a splendid advertisement for silage and lucerne, which I am glad to see are receiving the prominence they should in the *Journal of Agriculture*."

CATECHISM OF PRACTICAL AGRICULTURE.

CONTINUED.

PRIMROSE McCONNELL.

23. *Name some of the causes to which the want of success in farming is due.*

Failing to give keen personal attention to the whole work of the farm. The want of experience in farming methods, combined with a scorn of advice from, and valuable demonstrations made by, those skilled in the profession. The lack of judgment in buying and selling. The continuous change from one system of farming to another. The choice of unsound land. The choice of stock unsuited to the land. Failing to adopt preventive measures in connection with well-known live-stock diseases. Carrying on a system of farming which is not suitable for the locality, and the lack of a sufficiency of capital.

24. *Name some of the causes that may combine to defeat the best efforts of the farmer.*

Unavoidable destruction by the elements—fire, flood, storm, &c. Disease epidemics among live-stock. Unexpected illness of the farmer himself. Unforeseen and prolonged lowering of the prices of farm-produce he has for disposal, and the failure of purchasers to pay for goods sold to them.

25. *Should a farmer keep books? If so, what should be their nature?*

It is not necessary for a farmer to have an elaborate system of book-keeping, but he will find it of great benefit to keep the following:—

(*a.*) A rough diary showing each day's work on the farm and the state of the weather.

(*b.*) A field-book showing the variety of crops grown on every field in the farm, the manures applied, and the results.

(*c.*) An account-book, which should show the amount of cash in hand, the amount due for goods received, the value of live and dead stock, and the value of improvements at the commencement of the year. During the year all purchases and sales should be entered up, and at the end of the year another valuation should be made, as above, and a rough balance-sheet drawn up which will show the true financial position.

THE SOIL.

26. *What is the soil?*

The soil, from the farmer's standpoint, is the comparatively thin layer of the earth's surface which he turns over in the course of his cultivation-work.

27. *How has the soil been formed?*

By the disintegration, or breaking up, of the rocks on the earth's surface, principally through the action of the weather.

28. *What is the relation of the soil to plants?*

The soil gives the plants support, or root-hold, and supplies them with the greater part of their necessary food.

29. *From what source does the remainder of the plant-food come?*

From the atmosphere.

30. *What are the principal plant-food constituents of a fertile soil?*

Nitrogen, phosphoric acid, potash, and lime.

31. *In what proportions are those ingredients to be found in an average fertile soil?*

Nitrogen, 0·16 per cent.; phosphoric acid, 0·16 per cent.; potash, 0·3 per cent.; lime, from 0·5 per cent. to 1 per cent.

32. *What is humus?*

Humus is the black organic matter of surface soils which is resistant to decay, or the remains of organic matter after it has lost its form.

33. *Have the functions of humus in the soil been placed beyond doubt?*

No; they are only imperfectly understood.

34. *Name some of the beneficial ways in which it is generally acccepted that humus acts on plant-life.*

Humus provides a supply of nitrogen, increases the water-holding capacity of the soil, regulates its temperature, and improves its texture.

35. *How may you renew the supply of humus in a worn-out soil?*

By the application of farmyard manure, or by ploughing under green crops.

36. *Name some conditions that prevent the beneficial action of humus?*

The presence of stagnant water in the soil, the absence of lime, or the lack of good cultivation.

37. *Name some things, other than the demands of plants, that deplete the humus in the soil.*

The application of too much burnt lime, and continuous deep cultivation during hot, dry weather, particularly on light, dry soils.

38. *How would you classify soils?*

Soils may be classified as heavy clay, loamy clay, loam, sandy loam, and sandy.

39. *State the proportions of clay in each class.*

Heavy clay contains 60 per cent. clay; loamy clay, 40 per cent. clay; loam, 30 per cent. clay; sandy loam, 20 per cent. clay; sandy, 8 per cent. clay.

40. *Name another class of soil which occurs less often than those already mentioned.*

A humus soil, which contains about 7 per cent. vegetable matter.

41. *What is meant by the "mechanical condition" of soils?*

When a farmer describes his soil as free-working, tenacious, sticky, light, heavy, &c., he refers to its mechanical condition.

42. *Name some things that beneficially influence the mechanical condition of soils.*

Good drainage, the presence of a sufficiency of lime, the exposure of the soil to the action of the weather by means of good cultivation, and the application of farmyard manure, or the ploughing-under of green crops.

43. *Name something else that has a very great influence on the fertility of soils.*

The action of certain low and very minute forms of life, or micro-organisms, which are present in all soils in countless millions.

44. *Name some conditions that obtain in all soils in which those organisms work beneficially.*

Good drainage, thorough cultivation, and the presence of a sufficiency of lime.

45. *Is the action of those forms of life or bacteria well understood?*

No; their functions are, as yet, very obscure.

46. *What other forms of life exert a great influence on the fertility of the soil?*

Earth-worms.

47. *Describe briefly the action of the earth-worms.*

By perforating the soil in all directions they admit air and water. Large quantities of the soil are passed through their bodies and deposited on the surface of the ground, and, being mixed with half-digested leaves and other vegetable matter which they have dragged underground, it forms a valuable manure.

48. *In garden ground what is the estimated weight of soil brought up by earth-worms in one year?*

About 10 tons per acre.

49. *What is meant by "acidity" in soils?*

Acidity is caused by the absence of air in soils while decomposition of organic matter is going on, or it may arise through faulty manuring.

50. *What are the two main factors that go to correct acidity in soils?*

Lime and drainage.

FATS IN FOOD.

At a recent meeting of the American Medical Association, Professor Mendel, of Yale University, presented an exceedingly interesting paper on foods and nutrition, in which he gave an account of studies made by him for the purpose of determining the food value of various commonly used fats.

In experiments upon young animals Professor Mendel found that when lard was the only fat used there was a cessation of growth and decline of weight at the end of three months. When butter-fat was used there was no sign whatever of failure after feeding for a year or more.

Cotton-seed oil is mentioned by Professor Mendel as belonging in the same category with lard. In the same class also he placed numerous other chemical fats which have been recently offered as a substitute for butter.

The processes to which these artificial products are submitted are believed by many authorities such as to depreciate, if not destroy, their food value. Many facts have come to light in recent times which indicate that many of the processes employed in the preparation of food are damaging and sometimes highly destructive. Long cooking at high temperature, for example, is now known to destroy the vitamines which play such a useful part in all our food.

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

PRIMROSE McCONNELL.

In many parts of New Zealand the sowing of grasses and clovers for temporary and permanent pastures is the principal work of the month; but, although of the utmost importance, it is work that is often carried out carelessly, and failure, to a great extent, is invited. The basis of the live-stock industry in New Zealand is pasture grass, and many thousands of cattle and sheep are reared and fattened on this food alone. In laying down pastures there are several essentials, the chief of which are,—

(*a.*) That the land be in as good condition as its nature will permit when assisted by good cultivation and liberal manuring.

(*b.*) That the previous crop be a fallow or cleaning one, such as rape, turnips, &c.

(*c.*) That the seed varieties be suitable for the locality.

(*d.*) That the seeds be pure, of good quality, have a high germinating-capacity, and should be delivered to the purchaser unmixed.

All good seed has a bright appearance, is plump, and is free from musty smell.

Many pastures are laid down immediately after a cereal crop has been harvested, and, in the writer's opinion, no system could be worse. On average land a cereal crop leaves the soil more or less exhausted and foul with weeds, two conditions which are fatal to real success. Rape is one of the best crops to precede pasture, as it leaves the land in fertile condition, and comparatively free from weeds. At Ruakura it is found quite possible to sow the pasture seeds in March after feeding off three growths

of rape. If the cultivation for the rape or other similar preceding crop has been deep and thorough, that for the clovers and grasses need not be deep, but there should be a fine tilth. In many instances a good tilth may be obtained by the use of the disc and tine harrow and roller, without the use of the plough. The roller should always precede the seed-drill. The use of the coulter drill is advisable, but care should be taken not to cover the seeds too deeply.

In Britain special light coulter drills are kept for sowing grass and clover seeds only, the coulters being so light that too deep covering is impossible. On the other hand, the seeds may be surface-sown, after the Cambridge roller, either by hand or by some of the latest broadcast manure-distributors, which make excellent work, the seeds being afterwards covered in with a light chain or brush harrow.

It is recognized, however, that autumn sowing in the later districts is often impossible, and spring sowing must be resorted to, but in the North Island the best results are had from autumn sowing. In many parts of the South Island success is obtained by sowing the seeds with a cereal crop, but in the North Island, generally speaking, this plan results in failure.

Seed prescriptions must vary with the locality and the nature of the soil. New introductions, with an exceptionally long list of good qualities, should be looked upon with some suspicion, although it is good policy to try them on a small scale. On good to medium soils the old varieties still hold their own, and the plant breeder and selector are gradually improving them. Indeed, it is more profitable, as a rule, to improve the old than introduce the new. Some of the new introductions have proved their value under exceptional conditions. Paspalum, for instance, which should never be sown on good soils or in districts subject to frosts, has proved of great value on some of the poor dry soil of North Auckland, and in parts of Australia. As a rule, the farmer with some local experience, and who spends some time in observation, can make up a prescription that will suit his own particular conditions better than the expert who has no local knowledge.

When laying down a pasture lime may be applied to great advantage in the average case, and in order to prove its value, or otherwise, an unlimed check-plot should always be left and carefully marked with stout firmly driven pegs. As to manure, basic superphosphate in conjunction with the lime may be used with every confidence. On clay soils or peaty swamps basic slag never fails to give excellent results. When the soil is deficient

in potash, as is often the case when it is of a sandy or gravelly nature, a little muriate should be added. As a mixture, slag and Seychelles Island guano is good, also basic slag and superphosphate.

On sandy or gravelly soils the addition of a little finely ground bones to the basic super is valuable, but the price is now almost prohibitive. On clay soils bones should not be used, even when low in price, as they lie for years in a more or less dormant condition.

In making up a permanent-pasture prescription it is well to consider whether we are not in the habit of using too much rye-grass. On the majority of soils even the perennial variety is in evidence for about two years only, and if sown too thickly it very often happens that some of the more permanent grasses are completely smothered out during the first season, when rye-grass is at its best. On the other hand, they should not be altogether omitted, because they are quick growers, and provide a good bulk of nutritious feed before many of the more permanent grasses are available.

No grass of itself is capable of making a reasonably good permanent pasture; also, there must be a mixture of what we term "top" and "bottom" grasses. Of the former, the principal are cocksfoot, rye-grass, tall oat-grass, timothy, meadow-fescue, and tall fescue. Tall oat-grass is a variety much neglected in New Zealand, and it has many good qualities. Although it is at its best on light dry soils, it will grow almost anywhere, is a rapid grower, and palatable. Crested dogstail should be included in every mixture, and clovers should be sown liberally. In some instances alsike has proved more permanent than red clover, but when clovers fail it is, as a rule, an indication of the lack of lime or phosphates, or both. In such cases the acid superphosphate should never be used, except in conjunction with liberal doses of lime. Cocksfoot must still be accepted as the king of New Zealand pasture grasses, and should be used liberally on most soils. Tap-rooted plants such as chicory are undoubtedly soil-improvers, and may be sown at the rate of 1 lb. per acre. For temporary pasture a mixture of rye-grass, tall oat-grass, and red and crimson clovers is excellent. The quantity of seed per acre may vary from 25 lb. to 35 lb., or even more, but a too heavy seeding cannot be recommended any more than a too light.

In many districts potato-digging will be in full swing, and where large areas have to be tackled the mechanical digger is undoubtedly a labour-saver, also a weed-eradicator, as the wide share cuts all roots at a good depth; and if the ground is gone over with the

cultivator and harrows immediately the potatoes are harvested, all weeds will be brought to the surface. Potatoes intended for seed next season should be dug when not quite mature, as they yield a better crop, and one much freer from disease. In selecting potatoes for seed the best results can only be had by hand-digging, because the tubers should be selected from individual plants which yield the greatest number of good-sized tubers true to form and free from disease. In selecting from the heap, after harvesting, many tubers are saved for seed which are quite undesirable, for although they may be true to form they may be the offspring of unprolific parents and hand on their weaknesses to the coming crop. The best system of storing seed potatoes is to place them in shallow boxes (tier upon tier) in a well-lit, well-ventilated shed, which, if possible, should be in the shade of good-sized trees. A catch-crop such as mustard may be sown immediately the potatoes are harvested, and either fed off or ploughed under as green manure. Other catch-crops such as Western Wolths, Cape barley, tares, rye, oats, crimson clover, peas, &c., may still be sown.

All surplus maize or similar forage crops should be made into ensilage, in order to secure them from the effects of early frosts.

Stubble paddocks not intended for catch-crops should be ploughed to a good depth as soon as possible, so that they may reap the advantages of exposure to the frosts, sun, and air of winter. Fences will require attention, and roads should be repaired as well as circumstances will permit. Leaky buildings should also be seen to before winter sets in.

The beginning of winter is always the crucial test for young stock, and as they are gradually but surely advancing in price they will repay liberal treatment. The freezing-price of beef is almost double that of three years ago, and, although the war is undoubtedly a factor in the upward trend of prices, there is every promise that they will not only hold good but go higher.

There is thus every inducement for the farmer to treat his young stock with greater liberality. On a farm that is entirely devoted to dairy-farming the writer does not hold with those who contend that the dairyman should rear and ultimately fatten all his steer calves; but if they are sufficiently well bred they should undoubtedly be reared to the weaning-stage, and then passed on to the farmer who does no dairying. When a high retail price is being obtained for the milk the better plan is undoubtedly to sell the calf immediately it is born, if only for a shilling or two. There are also a number of badly bred calves which never pay for rearing under any circumstances.

THE ORCHARD.

J. A. CAMPBELL.

SURFACE CULTIVATION.

THE full value of cultivation, especially surface cultivation—that is, the frequent and thorough disturbance of the surface soil—during the dry season, for the destruction of weeds and the retention of moisture, is not yet fully appreciated by all fruitgrowers; others, whilst recognizing many of the advantages of this work, are inclined, owing to the difficulty of working among trees laden with fruit and the additional labour required in harvesting their crops from now onward, to neglect this necessary work, consoling themselves with the thought that the soil requires humus, and any weeds that start after cultivation ceases will, when ploughed in, answer very well for this purpose. Unfortunately, or fortunately, in some districts the majority of orchard-weeds succumb to the first hard frost, and are usually more or less dead and dried up, and are of little value to the soil when ploughed in. It is also doubtful whether any good would result from ploughing in such weeds as *Amaranthus* and *Portulacca*. In other places sorrel and docks would predominate, with probably some of the brome and other grasses. The latter may be of value, but sorrel and docks are a bane in every case.

The proper care of an orchard necessitates either clean cultivation or the sowing of a cover-crop according to the nature of the soil. Practically all soils are benefited by the addition of humus, particularly those of a light and sandy nature. With these the raising and ultimate ploughing-in of a leguminous crop, such as tares, peas, &c., will very materially improve the fertility of the soil by adding to it both humus and nitrogen. This form of crop can usually be sown with advantage during next month after the usual March rains.

The difficulty of working among trees laden with fruit applies to those of a weak framework, the branches of which, when laden with fruit, bow down after the style of a weeping willow, rendering cultivation without damage practically impossible. Trees of this kind, although altogether objectionable, still exist, and have to be taken into account. Early and thorough tying-up of the branches is very necessary, not only to facilitate cultivation, but to prevent the trees from breaking down with the weight of the fruit, and also ensure as far as possible a healthy growth, which will soon

cease to be made if the branches are allowed to bow down year after year.

To avoid as far as possible the foregoing difficulties, every possible care should be taken to build up a tree that will not bend down to an abnormal extent.

SUMMER PRUNING.

No doubt in most cases summer pruning will have been completed ere this, but where this has not been done, particularly in reference to young and vigorous growing apple and pear trees, the work should be put in hand right away. It should be mainly in the direction of the total removal of all surplus wood growths not required for the formation of the tree both from the centre and from the main branches. This will provide for a free admission of both air and light necessary for the proper hardening-off, or ripening, of the fruiting-wood. The longer laterals may be reduced by one-half, in the hope of developing fruit-buds on the part that remains. Should it prove too late in the season for this development to take place they can be cut still further back or removed entirely at the winter pruning. The above process of opening up the tree has another particular advantage in reference to those varieties of apples subject to attacks of woolly aphis.

This pernicious insect, although thoroughly enjoying the summer weather, has a decided distaste for anything approaching the direct heat of the sun, but thrives to advantage on the soft, succulent wood to be found in the shady centre of a dense-growing young tree. The removal of this surplus wood not only retards the increase of the aphis but allows of a thorough application of a summer spray often found necessary to further check the insect until the stronger winter sprays can be used.

SPRAYING.

Codlin-moth.—This is a matter which should not be too readily overlooked during this month, especially in the warmer parts of the Dominion, and more particularly in those districts taking part in the export of fruit. One of the greatest dangers to the export of clean fruit, and one also which often causes dissatisfaction and loss to the supplier through the condemnation of fruit on the local markets, is the failure on the part of the grower to spray sufficiently late in the season.

Owing to labour and expense the natural desire is to eliminate as many sprayings as possible, but this should not be done to the

danger of the crop. A longer period can with safety be left between sprayings than between the last spraying and the time of picking. In the former case, when if the interval is slightly too long, the fruit can often be saved although in a blemished condition through the habit of the then very small grub in enlarging its accommodation, working its way to the outer side of the fruit and there getting sufficient poison to destroy it, providing the spray has been applied in the meantime. This accounts for those apple and pear blemishes known as "moth stings." To avoid this, if for no other reason, the interval between sprayings should not be too long. The same class of infection often takes place just prior to picking, and in this lies a grave danger to our export trade.

The class of fruit most liable to become affected in this way is the early export varieties. For the benefit of colour and maturity the grower is anxious to let these fruits hang as long as possible, with the result that they have to be immediately packed after picking, leaving no time for the grub to develop and become more evident whilst in the process of picking and before sorting. The only indication of the presence of the grub, a minute speck of dust on the skin of the fruit, is almost sure to be rubbed off, after which the inspection must be very careful indeed to detect the very small puncture.

Through misadventure, want of knowledge, &c., this class of infection too frequently happens. I have in mind a 20-acre orchard affected in this way, from which, after the usual method of picking, not one case of the fruit could have been guaranteed to reach its destination in a sound condition if packed immediately after picking. From time to time many cases of fruit of this kind, very carefully sorted, and apparently sound, no doubt, at the time of packing, have been condemned some time after reaching the market, during which time the grub has become more plainly evident. This greatly to the disgust of the packer, who is quite satisfied he has been badly treated by the Inspector. Cases of this kind are bad enough on our local markets—when the individual alone is likely to be the principal one to suffer—but they are much more serious when the fruit is exported. Of the many things we have to guard against in building up our export trade the primary one is that of packing mothy fruit. To minimize the danger of this, spraying should be continued to within a fortnight of picking, until all danger of moth-infection has passed. The time indicated depends entirely on the locality and season. In the Hawke's Bay and Auckland Districts there is more or less danger throughout the whole of March.

For the control of the moth use 1½ lb. to 2 lb. of paste arsenate of lead or ¾ lb. to 1 lb. of powdered arsenate to 50 gallons of water. Spraying to be repeated at intervals of not more than three weeks.

Leech.—Although most of the damage is done by this pest earlier in the season, a damage far greater than is generally appreciated, still where necessary spraying should be attended to. The strength of spray for the purpose for pip-fruits is arsenate of lead as recommended for codlin-moth. For stone-fruits one-half that strength should be used, or powdered white helebore in the proportion of ½ oz. to a gallon of water.

Black-spot or Scab.—Although there may be considerably less danger of outbursts of this disease from now onward, late varieties of apples subject to the disease, such as the Dougherty, are still liable to attack, especially after the usual March rains. Therefore, should climatic conditions favourable to the disease be experienced, a fungicide should be combined with the arsenate when spraying. In the case of the Dougherty the summer formula of Bordeaux mixture is preferable, as it can be safely used on this variety without causing that disastrous russetting effect which it undoubtedly does when applied to many of the less hardy varieties. In reference to the latter, the lime-sulphur mixture at 1–100 has proved very satisfactory in warding off attacks of black-spot, besides being very beneficial in keeping in check red mite and powdery mildew.

Red Mite.—For pip-fruits use lime-sulphur 1–100 to 1–110, and for stone-fruits the same spray at 1–125.

Whale-oil Soap.—Preparation: Warm 14 lb. of whale-oil, and in another vessel dissolve 2 lb. of caustic soda. Let the latter cool until it is just warm, and then slowly add the warm oil, stirring well. When cold this will set as a hard soap. Boil for about half an hour 5 lb. of this soap, 7 oz. of sulphur, and 5 oz. of caustic soda in 3 gallons of water. Make up to 40 gallons. Spray in the evening or on a dull day. This spray is very satisfactory in controlling attacks of red mite in the growing season, and can be safely used on stone as well as pip fruits.

Woolly Aphis.—This pest, where not checked, will still be doing considerable damage to both leaf and fruit buds. Either of the following compounds will be found useful in checking this until the stronger winter remedies can be applied: McDougall's insecticide 1 in 50, or resin-and-soda wash. Resin-and-soda wash is prepared as follows: 1½ lb. resin, 1 lb. washing-soda, 2 gallons of water. Boil the water, dissolve the soda, add the resin, and continue boiling until the resin has thoroughly dissolved. Add about 3 quarts to

each 50 gallons of water or arsenate-of-lead spray if spraying for codlin-moth.

EXPORT.

Probably the first export shipment of fruit to South America for the season will be made during the month. Some very valuable advice has been given recently on this matter, which, summed up, amounts to this: Ship only those varieties calculated to satisfy the wishes of our South American buyers; exercise all care in sorting, grading, packing, and handling of fruit forwarded; and refrain from "ringing in" even if opportunity offers. In other words, supply the South American buyer with what he wants, and what he wants only, and in the manner he wants it. If this is done it must result in mutual satisfaction to both countries.

THE VINEYARD.

S. F. ANDERSON.

As we approach the dormant season of the vine and other fruit-bearing trees of a deciduous nature a few notes on pruning at this stage will give time for their consideration now and application later on. No claim is made to originality; they are just a short summing-up of what is known to the practical pruner.

Why do we prune? *First,* excessive growth and fruit-bearing are inconsistent with plant-management. Pruning, therefore, consists in great measure in balancing the leaf-vigour with the fruit-production; *second,* to produce larger and better fruit; *third,* to keep the plant within manageable shape and limits without impairing its vigour; *fourth,* to change the habit of the plant from root to fruit, and *vice versa*; *fifth,* to remove all surplus or injured parts; *sixth,* to facilitate harvesting, spraying, sulphuring, and cultivation; *seventh,* to train plants to some desired form.

The following general laws relating to pruning, laid down by G. Foex, of the Montpellier Viticultural College, France, are taken from Professor A. Perkins's book on vine-pruning. A few notes are added giving examples of the application of these laws. *First law:* The vigour of a plant or of an individual shoot under equal conditions is in direct ratio to the number of its leaves. (The lateral of a vine carrying a bunch of grapes must not be deprived to a harmful extent of its leaves, or its fruit will be small.)

Second law: The nearer a shoot or portion of a shoot approaches to a vertical line the greater its vigour of vegetation. (This is perhaps more true of the vine than of most plants, hence the reason for low sides to a vinehouse. The upright portion of the stem soon ceases to bear fruit, but as soon as an angle is reached it bears regularly. A vine climbing a tree does not bear until spreading out among the branches.) *Third law:* Conversely, the vigour of vegetation of a shoot or portion of a shoot diminishes with the size of angle which the shoot makes with a vertical line. *Fourth law:* Deformations of any kind, such as those produced by wounds, compression, or torsion, diminish the activity of vegetation of plants or of those parts of plants which are affected by them. (Bending down, ringing, twisting, binding wire round a branch, are all methods used which confirm this law.) *Fifth law:* The smaller the number of buds on a shoot (or rod) the greater the vigour of each individual shoot growing from them. (This is shown where a rod has lost a number of its laterals: the growth at the terminal is very strong as well as on the remaining laterals.) *Sixth law:* When a series of shoots of a healthy plant are placed on different levels, all other things being equal, it is generally the topmost shoot which absorbs most sap and becomes the most vigorous. (We have an instance of this in our vinehouses. After pruning the rods, and before they are tied up again into their places, the top portion of each is kept bound down until some growth is made, to make them start more evenly after being tied up. Otherwise the rush of sap is to the top buds of the rod.) *Seventh law:* When a portion of a shoot is bent sharply round, buds situated close to or just below the spot where the shoot leaves the vertical line will give rise to very vigorous shoots, whilst those situated beyond will suffer accordingly. (We have an instance of this in training the vine outdoors. It occurs in passing a vine-rod round an end post or strainer. It is therefore better to turn the end of the rod down.) *Eighth law:* In any plant or individual shoot of a plant the number of flowers is in inverse ratio to its activity of vegetation. (This is shown by plants growing in very poor soil, deprived of water, or otherwise strained, such as by *Phylloxera* at the roots, &c. Plants growing in pots in conservatories or on hot verandas that have been irregularly attended to are instances of this law.) *Ninth law:* The production of fruit by deviating from the main organs of the plant nutritive elements and by concentrating them in parts which are useless to the plants themselves is always exhaustive in its effects. (By the main organs of a plant we assume the roots and leaves are meant, and the nutritive elements such as pure air to the

leaves, and food in solution to the roots. Applied to pruning, persistent defoliating or injury to the roots would bring about such results.) *Tenth law:* The smaller the number of fruit the greater their volume in size. (Where a vine is bearing an over-crop, such as may occur in a very vigorous outdoor-grown table-grape such as Black Hamburg, Golden Chasselas, &c., it is wise to reduce the fruit to one bunch to each lateral, as practised in the vinehouse.) *Eleventh law:* The development of the fruit is inversely proportional to the size of the shoots which bear them. (This law is manifest in the case of strong upright-growing shoots from the centre of a vine or fruit-tree.)

As soon as the fruit has attained its full size all stopping or suppression of growth should cease. Every leaf now left until the winter is helpful to ripening the wood and yielding up to the plant those substances that are stored up to assist the future season's growth. The only exception made to this treatment is in late and wet autumns. Then, to permit of the more rapid drying of the fruit after rain it is recommended to strip off some of the looser leaves. These, however, have generally turned tough and yellow, and are of very little service to the plant.

For the benefit of those who may not have seen the vine-yard notes in the February *Journal* of last year the following extracts are made:—

To make good wine the grapes must be ripe. The quality and colour of the wine depend very much upon this. It means a pretty long fight with the birds before the grapes can be got in. In no other country, as far as I have been able to ascertain, are the grapes gathered so much before being ripe as in this Dominion. On the Continent of Europe, where conditions are very similar to those of New Zealand, the grapes are not gathered until the rains and frosts of the latest autumn necessitate the vintage. As a rule, our grapes have attained their maximum in saccharine by the end of March. The object of these notes is to point out as forcibly as possible the importance of obtaining to the fullest degree those peculiar virtues of the wine-grape that can be gained only by their being over rather than under ripe. Nearly all the wine made in the Dominion runs high in acid. Wine made from thoroughly ripe grapes will not have an excess of acid. The Cabernet Sauvignon, Hermitage or Shiraz, Riesling, and Pinot Chardonay are varieties with tough skin and open bunches that can be left to hang as long as desirable. The Pinots Meunier, Noir, and Gris are closely clustered, and do not stand the wet so well, but as they are among the first to ripen they do not always meet with the worst weather-conditions.

We know that great loss of crop is sometimes experienced through the ravages of birds, and at times bad weather, but, as pointed out before, not greater than that met with in other countries. It is desirable at times as the grapes come in that they should be spread out to dry, to become even slightly desiccated before being put through the stemmer and crusher. It also affords an opportunity of picking out rotten or under-ripened bunches, and thorough revision of what is going through for wines. Good wine can only be made from good grapes.

In the Cellar.

Where wine-making is carried on, all cellar machinery must be carefully overhauled and seen to be in perfect working-order. The walls of the fermenting-house should be whitewashed with newly slaked lime. If the floor is of earth, this should be swept to a hard surface and then well dusted with lime. All woodwork such as vats, casks, stands, and benches should be scrubbed clean. While this work doing which requires a general shifting of things is going on the hoops of vats and casks can be driven on, and their thorough cleaning attended to.

THE POULTRY-YARD.

F. C. BROWN.

THE PRESENT POSITION.

THE extraordinary position of the wheat-supply, which makes this common diet of poultry too costly even when fed to birds of exceptional laying-power, is having a serious effect on the business of poultry-keeping. While this is so there is not wanting evidence that the experience being gained may not improbably prove a blessing in disguise. Instead of reform in the methods of feeding poultry necessary in a country where wheat-growing gives every evidence of declining in importance in the face of the steady extension of other phases of farming being indefinitely postponed the high prices of wheat are forcing the poultryman to be less wasteful in his feeding-methods, and to experiment with substitute foods which may very probably bring out a much more economical ration than at present obtains, to the lasting benefit of the industry. Not only this, but it may be found profitable to use a much larger

proportion of feeding-materials which can be grown by any one who has a small plot of land which can be cultivated. This will mainly apply to green stuff, especially such a valuable material as lucerne—the more extended use of which has been repeatedly advocated in these columns—for it will never pay the poultryman to grow grain on a scale to suit his requirements. In the meantime, poultrymen have to make the best use of the foodstuffs available. There is, of course, nothing to take the place of wheat among the grains; the higher feeding-value of wheat over that of other grains is not generally realized. Many people think that because a bushel of wheat is twice the price of a bushel of oats it is twice as dear, whereas it may easily be twice as cheap when the respective qualities are taken into consideration. A little explanation may make this more clear. There are 40 lb. of oats to a bushel against 60 lb. of wheat to a bushel. Probably about one-half of the former consists of husks altogether useless for feeding purposes, whereas with the latter the whole of the weight, excepting, maybe, a fraction of extraneous material, amounting to 1 or 2 per cent., is valuable food. For instance, take oats at, say, 4s. a bushel, this would give from 20 lb. to 25 lb. of feeding-material; but a bushel of wheat, valued at, say, 8s. a bushel, would give nearly 60 lb. of grain and meal. Thus we have about three times the weight of nutritive elements in wheat we have in oats, and at only double the price. There is also a considerable difference in favour of wheat when compared with barley. Maize has certainly a high feeding-value, but its larger fat-content makes it more suitable for winter than for summer feeding. It will therefore be seen that the bushel prices of wheat and other grains do not represent their relative feeding-values. If wheat is very high in value, it will probably be found that the grains being used to displace it are even dearer, when relative feeding-values are considered. The observant poultryman will have noticed that when he has substituted oats for wheat it takes a much greater quantity of the former than it did of the latter to satisfy the birds. The poultryman must therefore look mainly to substitutes other than grain for the dear or unobtainable wheat. The common alternative is to feed mashes, but here again he is faced with the abnormal cost of pollard and bran, probably the dearest foodstuffs at the present time; and the high price is demanded for a generally inferior article. The procedure I would suggest is to make the morning and evening feeds of cooked grains, such as oats or barley (it being taken for granted that wheat is unavailable), boiling these up the previous evening with good green stuff—chaffed lucerne for preference—and 6 per cent.

of meat-meal, only sufficient water being used to leave the mash well cooked, but in a fairly dry condition, on the following morning. This may be fed both morning and evening. Where lucerne is not available any good vegetables may be used. These should be cut up into small pieces, so that they may be easily cooked. This will not only add bulk to the food, but will make it appetizing — an essential requirement in feeding poultry which is too often overlooked. If the mixture is too sloppy in the morning it should be dried off with ground grains or any meal at hand. Meat-meal, placed in hoppers, may be before the birds at all times, so that they may be able to balance their own rations, while some fresh green stuff should be provided. When fresh lucerne is not available lucerne hay may be employed, but when this is used it should be well steeped. This system of feeding is not recommended as ideal for egg-production, but it should maintain the yield well at the present season of the year, and ensure a fair egg-production even in the winter months, providing the birds are well cared for in other respects. This should be sufficient for us. The excessive cost of the staple grain, and the very high prices being asked for pollard and bran, are but a temporary experience, and if a payable egg-yield can be gained in the meantime it should in these anxious times make poultrymen content to calmly wait for a return to normal conditions.

BETTER MANAGEMENT IMPERATIVE.

Though feed is at an abnormal level of value it would be possible for many poultrymen to make the business pay, or, at least, show some margin over cost of production did they make a determined effort to conduct their work on sound principles. It has been possible in the past to make a good profit from poultry while neglecting many necessary details, the cause of serious leakages. If these weaknesses be now corrected the money thus saved may not improbably counterbalance the increased cost of production. The conspicuously successful men in any business owe their success more to careful work in eliminating losses than in obtaining better prices than others for their produce; in other words, they make the fullest possible profit on everything they handle, not being content with counteracting losses in one direction by profits in another. For instance, a man may make a fair success at poultry though he may not cull sufficiently, nor provide the best housing-accommodation, nor fight vermin as he should, nor take the necessary care in marketing his eggs. Could he be now persuaded to clear out every old bird, as well as every surplus

cockerell; to make the houses really comfortable for winter, and keep these in an absolutely sanitary condition; to have clean nests, and, therefore, clean eggs, and gather these every day, and send them to market in a clean and attractive condition, he would be taking the surest course in making up for the high cost of his feeding-materials; and the reform in his methods would not only make poultry-keeping pay under existing conditions, but would open his eyes to its money-making possibilities when food-values regain their normal level. While the exercise of greater care and intelligent thought in the directions indicated would be great aids, with the margin of profit at present seriously reduced, they would be futile unaccompanied by a sound system of feeding. The feeding of fowls cannot be skimped. Above all, food should be in abundant supply, and the quality should be as good as is possible under the circumstances. It never pays to supply a high-type layer with an inferior diet. I have been sent samples of some of the foods now being offered to poultrymen at a comparatively cheap rate which would be dear at half, or even a quarter, of the money being asked for them. Some of the oats are nearly all husk, while one of the meals submitted consisted for the greater part of useless fibrous material. Good management and good feeding must go hand-in-hand.

It is always a mistake to keep more birds than the land and buildings will comfortably accommodate. Overcrowding is not only conducive to the development of vermin and disease germs, but is a serious check to heavy egg-production. We must now have every layer or prospective layer in the pink of condition, and maintain her in such a manner that she will be able to produce to her maximum capacity.

CULLING.

Effective culling is one of the main secrets of success in poultry-keeping, and under existing conditions it may easily spell the difference between success and failure. It is imperative to cull every layer over two years of age, and even many of last season's layers may be removed with distinct advantage. It is not every bird that is profitable in her second year, even with foodstuffs at their normal value. The rule has been already laid down in these pages that the early moulter is the first one to cull. Unfortunately, especially at the present time, moulting is not always an indication of the conclusion of the individual fowl's normal laying-period, but is more a sign that, either through false economy or owing to the inability of the owner to secure a supply of wheat,

she has been forced into the moult. It is well enough known that a sudden change of food or failure to provide the food necessary to heavy egg-production may suddenly force a bird into a premature moult. This is what has taken place at the present time on many plants. The ration has either been reduced below what it should be or has been changed from a good ration to one of a poor egg-producing character. Under these circumstances the early moulting rule is of little value, especially to the ordinary poultryman. I would here emphasize that unless these moulters give some indication of commencing to lay in the immediate future it were better to cull them at once. The probability is that they will not come on to lay again for several months, and if they do lay in the near future the laying-period will be brief, and consequently unprofitable. If such birds are kept on the plant the probability is that the profit from the pullets will be absorbed, or largely so, by the losses on these second-season birds, losses which would not be noticed in a normal season, but which may easily be disastrous in a season like the present. It is exceptional for the bird in her second season to lay a reasonable number of eggs during the late autumn and winter months. In visiting plants in the summer three- or four-year-old birds are often pointed out to me as heavy layers, but summer is a time when all birds are laying, even the sparrows. It is the bird that lays well in other than the natural laying season that is desired and that is really profitable.

It would be a mistake to cull birds at the present time that show indications of laying-power, such as—no indication of moulting, red combs, a fullness in the abdomen, and an active and business-like appearance. On the contrary, the birds that should be culled are those which are moulting or showing signs of it, those above the normal weight of the breed, those with poor development in the abdominal region, and those with indications of weak constitution—dull eye, loose feathering, and a sluggish appearance.

THIS SEASON'S PULLETS.

No greater mistake can be made than stinting the developing pullet. "Half the breeding goes down the mouth" may be a threadbare saying, but it is one of the most suggestive ideas ever stated. It is from the pullets that the main profits of the year are to be derived; but profit cannot be expected if the birds have not been brought to development and to the laying-stage in the most vigorous condition. Heavy production cannot be expected from a bird that has been stinted in its food, and has therefore not had an opportunity to build up a strong and robust constitution. With the rising egg-market there is every encouragement

to do the pullets well, though to secure the best results from them they should have been done well from the brooder stage. The pullet fed well, having food always before it, will eat less than when it is allowed to go hungry at certain periods of the day and becomes ravenously hungry at meal-time. To see fowls flying at those in charge, and following them about whenever they enter the runs, and this at all times, is a sure indication that the birds are on a starvation diet. The thriving bird is contented, and only in this condition can it make the proper progress.

THINGS TO REMEMBER.

Heavy culling is imperative on the majority of plants at the present time.

The older the fowls the lower the egg-yield.

A half-fed hen cannot lay to her fullest capacity.

There is no greater leak on poultry plants than the keeping of cockerels beyond a marketable stage.

It is useless trying to fatten cockerels unless they and their quarters are free from vermin.

The sooner the pullets are placed in their winter quarters the less risk there will be of them going into a moult.

It was announced in the advertising pages of last issue that a limited number of breeding-pens could be obtained from the Milton Poultry-station at £2 for seven birds (including coop), and that these pens comprised either a cockerel and hens or a cock and pullets. This was an error, as the reduction in price only applies to hens, the standard price for pullets being 10s. A cockerel, however, may be obtained, if desired, with these breeding-pens.

LUCERNE:

ITS VALUE TO THE POULTRY-KEEPER.

W. S. HILL, B.Agric.

It is impossible to expect a profitable return from stock if when a staple food soars to a high level of value inferior substitutes are employed, and the animals in consequence do not obtain the food-materials they demand. Yet there are circumstances when, through too much reliance being placed on an expensive foodstuff, valuable and more economical substitutes are neglected. In regard to poultry-feeding, there has been for some years an ample supply

of grain that could be purchased at a reasonable price. This easy supply has perhaps caused undue reliance to be placed on grain as a food for poultry. The increasing shortage has caused the want to be somewhat acutely felt.

To be continually fed with grain is not an essential feature in the life of a bird, and it seems more natural that an ample supply of some nutritious fodder plant would almost replace the usual supply of grain. The plant most adapted for this purpose is lucerne. Found to be invaluable for the maintenance of perfect health in horses, cattle, sheep, and pigs, its usefulness also extends to the feeding of poultry. For this purpose lucerne can be utilized either as chaff, to largely replace the grain ration, or as green food. The comparative value of well-known poultry foods and lucerne is shown in the following table :—

Food.	Protein.	Fat.	Carbohydrates.	Fibre.	Water.
Maize	9·9	4·4	69·2	2·2	13·0
Wheat	12·1	1·9	69·0	1·9	13·4
Bran	14·3	4·2	52·2	10·2	13·2
Lucerne (chaff)	16·2	2·4	31·0	27·0	16·0
Grass (green)	3·0	0·8	13·1	6·0	75·0
Lucerne (green)	4·5	0·8	9·6	6·8	76·0

The great value of a plot of lucerne lies in the fact that it supplies a permanent source of highly nutritious fodder. No sooner is the plant cut back than new shoots spring out to form a fresh succulent growth. Those who have a plot of lucerne will amply testify as to its value during this season.

To those poultry-farmers wishing to sow lucerne it would seem advisable to prepare the land immediately. Lucerne requires a well-drained soil, free from weeds, sweet, and well supplied with organic matter. Any inclination to be acid or sour must be counteracted by draining, exposure to the atmosphere, and the application of quicklime or burnt limestone at the rate of 2 cwt. per square chain. With the exception of limestone land the application of this lime will be beneficial. The land intended for lucerne should be the recipient of all the valuable poultry manure. The application of this would save to some extent the purchase of artificial fertilizers. For autumn planting sow early in March, in order to have strong plants before the winter frosts set in. If winter frosts are severe in the locality, sowing would be preferably delayed until late spring. Prepare the land so that there is a good tilth on the surface, and then firm well by rolling until the feet will not sink. The seed may be broadcasted, and for

this purpose mix 2 lb. seed with from ¼ to ½ cwt. basic slag or other phosphatic fertilizer, or with soil where poultry manure is employed, and apply to a square chain. Lightly rake to cover seed, and again roll. To sow in drills make drills 14 in. to 24 in. apart. Sow seed and fertilizer very lightly at the rate of 1 lb. to 1½ lb. seed per square chain. Lightly cover and firm the drills. Keep as free from weeds as possible. If the lucerne does not grow sufficiently rapidly water with liquid manure or nitrate of soda at the rate of 1 lb. to 20 gallons of water. After cutting, and especially in hot, dry weather, keep the soil among the plants or between the drills well stirred. In many cases the use of inoculated soil is found to stimulate the growth. This soil may be obtained from any established plot of lucerne having nodules on the roots of the plants or from Moumahaki Experimental Farm. The varieties of lucerne most suited for general culture in this country are Marlborough, Hunter River, and Peruvian. The two former are the best all-round varieties, while the last-named variety grows more rapidly, yields more cuts, but does not produce the weight that can be obtained from the former. Poultry-farmers who have suitable land are strongly advised to prepare land for lucerne, and, if conditions are suitable, to sow down in early autumn.

THE APIARY.

F. A. JACOBSEN.

SEASONABLE HINTS.

DURING the ensuing weeks the commercial beekeeper will have his time fully occupied. Extracting the season's honey crop has begun, the most congenial of the year's work. It is to be regretted that some districts have experienced dry weather combined with strong winds. These uncontrollable factors have had the effect of curtailing the surplus honey to a variable extent.

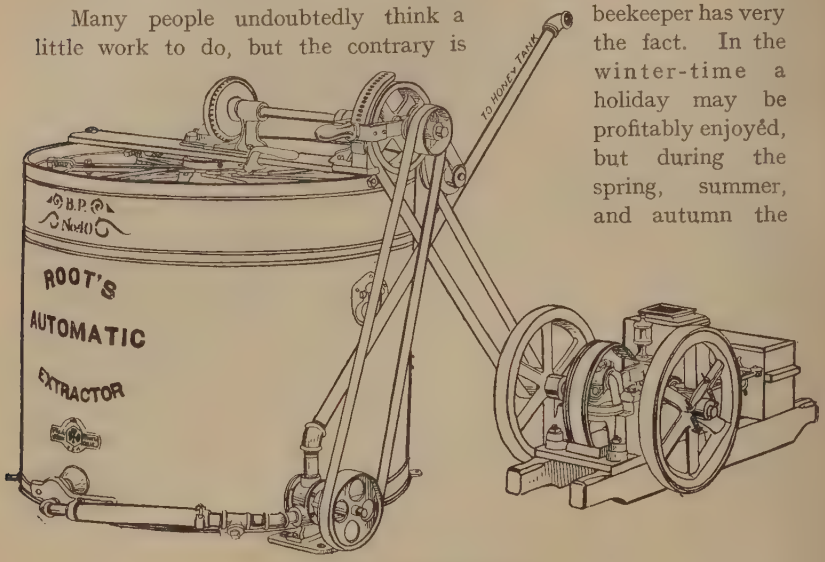
The beekeepers of Hawke's Bay have suffered most severely in respect to the dry weather, while those of Taranaki have, until very recently, had to contend against prevailing winds. The present indications for the latter province are now of a brighter aspect, while even if rain is experienced in Hawke's Bay the crop will not be stimulated this season.

EXTRACTING.

The work of taking the honey from the hives and extracting it from the combs by centrifugal force, thus permitting the same

combs to be refilled by the bees, has proved one of the most profitable of modern inventions. The machines used by the larger beekeepers are complete with many labour-saving devices, and further improvements are still being effected.

Many people undoubtedly think a beekeeper has very little work to do, but the contrary is the fact. In the winter-time a holiday may be profitably enjoyed, but during the spring, summer, and autumn the



HONEY POWER EXTRACTOR.

work in a large apiary is no child's play. For the next month the apiarist must work at very high pressure, and what can be done by a few can also be done by many. I am referring to two youths of eighteen years and one of twelve who last season took from the hives the supers, from which they extracted 3,400 lb. of honey, and replaced the combs in the hives again the same day.

Extracting is straightforward work and little scientific knowledge need be employed, so go right ahead and top this score.

EQUIPMENT.

For those who are doubtful about equipment a few words will suffice to place them on right lines. It is necessary in these days of improved methods and keen competition to start right and the rest will follow.

Have all the one kind of hives, either ten or twelve framed.

The bees, for two reasons, should be leather-coloured Italians. Firstly, these resist the disease foul-brood better than either bright

yellow or black bees; and, secondly, they secure for the bee-keeper a larger surplus of honey.

A reversible 2-, 4-, 6-, or 8-frame extractor, according to the number of colonies. For the two latter a small engine to drive them is practically essential.

A roomy bee-proof extracting-house with workshop attached, and with sufficient room in the extracting portion to contain the extractor, several tiers of supers, honey-tanks, &c. The tanks would, of course, vary in size according to the number of colonies. One large tank for settling the honey and a smaller one for improving the granulation. One of the two following: A honey-capping melter or an uncapping-can to be used in conjunction with a honey-capping press

I find the Bingham knife the most suitable for uncapping the honey in the combs. It can be heated by either steam or hot water.

All these things are necessary, and in addition a set of scales to weigh up to 1 cwt.

WHEN TO EXTRACT.

A number of beekeepers claim that they secure more honey if they extract three or four times during the season. That is probably correct, but great care must be taken to extract none but three-quarter sealed combs.

I personally think it advisable to extract but once, when all the combs are sealed. A better sample of honey is secured then, which has a heavy body containing the full-strength aroma of the flowers from which the honey was gathered.

If too much green honey is taken from the hives it will injure the quality of the whole, and possibly start fermentation. The process of ripening the honey in the hives by the bees would account for this, as sealed honey which is quite matured contains only about 16 per cent. of water, while green honey contains a very much larger quantity. It is the water-content that governs the keeping-quality of the honey.

A CO-OPERATIVE SCHEME.

The members in Taranaki of the New Zealand Honey-producers' Association are this season taking the initiative in a plan which may possibly spread throughout the Dominion. The shareholders are to only roughly strain their honey and then forward it to the Taranaki depot, which is also a Government grading-store. It is to be there thoroughly liquefied and subjected to the final straining. The blending of all the honey in large tanks and stirring for a fine grain is also under consideration. This branch

of the association is to be congratulated on its rapid progress. It purchased a suitable store some months ago, and installed a hot-air plant for liquefying.

THE FARM GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

By the time this is in print it will be time for most of the crops intended for winter and early spring use to be in the ground. It will be too late to plant anything in the way of *cabbage*, *broccoli*, and all that tribe. It will not be too late to sow *spinach*, *silver-beet*, and *turnips*. If the soil is dry, as in most places it is likely to be, the drills should be well watered after spinach-seed is put in and before covering it up. If this is neglected it will be most probable that the seed will be too long in germinating for the plants to make useful growth. The seed is somewhat hard, and so moisture is necessary for its germination. There will be no time to lose, so sow as soon as possible. Sow in lines at least 12 in. apart, thin the plants to about 9 in., and see that they stand singly. The round-seeded, so-called summer variety gives the best leaves, and is quite hardy enough for our climate. The above cultural directions are for the most part applicable to *silver-beet*, except that the beet should be thinned to 12 in. Both *spinach* and *silver-beet* require well-manured soil. Regarding *turnips*, the latest date on which it is wise to sow the winter crop of necessity varies considerably, even in places not far apart. Experience gives mid-March as a safe time. A little earlier does not matter. Much later might be too late, although the first week in April usually answers very well. A study of local conditions and notes of previous experience is the only sure guide, having in mind that it is best not to sow earlier than is necessary, for there is danger in getting growth too early. If the plants have a certain development before winter sets in they will continue to grow all through winter, and if that is secured it is better than having the bulbs large at the advent of winter, as they would become overgrown, and would not stand well. Winter turnips of the proper age are very sweet; not so if overgrown. I like to sow two varieties, a white for first use, and Orange Jelly, or a similar variety, for last use. The yellow sorts stand longer than the white, and are remarkably sweet when at their best. The yellow-fleshed varieties are proper winter sorts. They are inferior to the white-fleshed in summer. So long as the dry weather

continues no opportunity should be lost to cultivate the ground between growing crops; it is the surest way of keeping them growing. It is not necessary to bother about weeds between the plants in the actual line of cabbages and suchlike plants, provided they do not get tall. When a fair amount of growth has been made they require ridging up, and the soil drawn up in this process will cover the weeds. Between the rows of leeks the soil should be kept constantly loose, as this has a great effect on their growth. If they are grown in the old-fashioned trenches, and weeds are growing in them, the easiest and best way to destroy these weeds is to draw in a little soil, just sufficient to cover them, this being repeated as occasion requires, and in so doing two operations are performed at once—weeding and moulding up. If the *leeks* are grown on the flat in accordance with recommendations given previously in this *Journal*, weeds that grow between the plants in the rows can be smothered by this moulding-up process much more expeditiously than by any other means. In a similar manner a good deal of labour may be saved in weeding among other crops. Rows of dwarf beans, for instance, require moulding up. Weeds are sure to grow between the rows, and these can be destroyed in the act of moulding up, without devoting to them the time necessary for a special hoeing. Draw weeds and soil in together.

Celery.—Plenty of water and rich food are necessary to grow good celery. The amount of feeding, of course, depends on the natural quality of the soil, but, whatever this may be, it is hard to either overfeed or overwater celery. Abnormal heat and dryness at root are both likely to cause celery to run to seed. In combination these two factors are sure to do so. Moulding up is a matter requiring care. In one of the English horticultural papers there has been recently some correspondence regarding the cause of pithiness of the stems. The only cause they assign to it is poorness of soil, which is undoubtedly a likely cause, but in former days they assigned it to another cause, and I believe this to be a more frequent source of trouble—viz., want of care in moulding up. The soil should be pressed very firmly around the lower part of the heads, so as to prevent their own weight from bending the stems down. If the stems are caused to bulge outward—that is to say, not kept in a true line—the flow of sap is arrested, and pithiness results. Never mould up while the soil is dry, thoroughly water before moulding, or wait for rain to do it. Where moist conditions prevail slugs are usually present. Get rid of these before moulding or they may be very destructive. Wireworms, if closed in, will nibble the stems and give them a dirty, rusty appearance. A good sprinkling of soot will banish them, and this is also a good fertilizer.

Rhubarb.—Cease pulling stems of the ordinary rhubarb, as the autumn growth is required to form crowns. If the stalks are pulled after this time the spring crop will be late, or more properly there will be no real spring crop, as the first efforts of the growth will be necessary in building up the plants, doing, in fact, the work the autumn crop should do. Winter rhubarb should be treated to a mulch of good manure. It cannot be overfed. Liquid manure is a great help to it, and the plant will bear it very strong.

Lettuce may still be sown, preferably not to be transplanted, but thinned promptly. Tennis Ball or All the Year Round, being small, quickly hearting varieties, are most suitable at this season. Eschew the cos varieties. They do no good.

New Zealand Spinach.—There is a common belief that "fat-hen" (*Chenopodium album*) is native spinach. This is quite erroneous. The real plant is *Tetragona expansa*, a native with a trailing habit, making a very broad plant. The leaves are similar to spinach, but smaller, while the seed is similar but larger. The plant stands drought well, and is worth growing by those who like spinach, as the flavour is similar. Seed is stocked by most seedsmen.

SMALL FRUIT.

Red and White Currants.—In former issues it has been shown that the fruit is borne on short spurs in their second year, and for an indefinite number of years after, and never on wood of the current season. It is plain, therefore, that the only use of growth is to produce these spurs and the leading shoots required to build up the bush. The desideratum is a cup-shaped bush. There is, however, great difficulty in obtaining this shape, owing to the peculiarity of growth of the only varieties that in this country yield satisfactory crops. La Versailles and its varieties are the only kinds worth growing in New Zealand, so far as I have seen. The wood of these is rank in growth, and a peculiarity is the extreme ease with which the shoots break off at their junction with the old wood. Wind frequently effects this. Further, they are inclined to make twisted growth—that is to say, they do not usually ascend in the way we would like. All that can be done is to bring the ultimate growth as straight up as possible by pruning; but, as I said before, it is hard to get a well-shaped bush. The treatment of laterals is not affected by this bad habit. All laterals should in winter be pruned back to spurs; and to assist development of these, a partial shortening should be effected at once, if it has not been already done. It would not be safe to cut back to the places ultimately necessary, for if this were

done the spur-buds might break into growth. Cut back strong laterals to about 6 in. and weaker ones to about 4 in.

Black currants must not be so treated.

Gooseberry-bushes, if crowded, should be at once relieved of superfluous growth so as to let in light and air. The prejudice which still to some extent exists against radical summer pruning is fast being removed. Some think that it cripples root-action. While in theory this may be true, in practice it is not so. It has to be remembered that on this pruning abundant foliage is left to promote root-action, and as the roots will have a less leaf-surface to support they can then do their work better when various causes, such as dry weather and the producing of a crop of fruit, have to a large extent exhausted their energies.

Loganberries.—Remove the bearing-wood as soon as the fruit is exhausted, provided sufficient new rods have been retained. Each rod will bear twice—that is, two years—but it is better practice to lay in new ones every year. In case old rods are kept to fruit again, the laterals that have borne fruit must be spurred back during winter. The rods appear to be unable to bear fruit a third year.

Strawberries.—As soon as the soil has become moistened by rain, young plants should be taken from the parent bed, and be planted a few inches apart in convenient nursery rows in the best soil available. Here they will strengthen and become furnished with a strong set of roots.

FLOWER-GARDEN.

Carnation cuttings may be put out in the open ground as soon as autumn rains begin. Layers that were put down early in January should be fit to be taken from the parent plants. Plant them in nurse-beds in nice, friable soil. It is much better to keep them in nurse-beds for a few months than to plant them out in their permanent positions, because it is to be presumed that the nurse-beds will be prepared so as to afford facilities for making better roots than would in most cases be possible in the borders, and, more important still, it enables planting out to be eventually done in freshly worked soil. In most places spring is the best time to plant out permanently.

Sweet peas should be sown about the middle of March. In most instances this sowing gives better results than spring sowing, for the plants have a longer life, and the cool conditions encourage strong growth before flowering begins. In the latter respect they are very precocious when hot weather follows soon after sowing. To obtain the best results the soil should be deeply trenched, and manure worked in deep down, where the roots will find it. When

strong growth has been made it will give fresh energy when hot weather comes. Seed is often sown too thickly. It is well to sow more seed than the number of plants wanted, as accidents will happen, and slugs may destroy some of the plants. This may be mostly avoided if tobacco-dust is strewn about the young plants. After they become a certain size they are safe. The plants should be thinned when they are strong enough to be safe. For ordinary purposes it will do to thin to 6 in. apart. Growers of prize flowers allow more space than this. This more severe thinning has, however, drawbacks that may not compensate the grower of flowers for home use. Not the least of these drawbacks is the fact that extra space allows such strong growth of haulm as to require very strong supports. A more compact growth is more satisfactory to the utility grower.

Chrysanthemums should be securely tied to stakes of suitable height a long time before flowering begins, otherwise the growth becomes twisted, and it is extremely difficult to tie them up, taking a long time, and when finished being unsatisfactory.

Seeds of all descriptions, except the half-hardy summer annuals, may be sown. Hardy annuals may be sown in the open ground after autumn rains begin. Others in boxes under glass where such convenience exists, or in sheltered, warm positions, with a sheet of glass over a box to keep rain out, and otherwise maintain a uniform state of moisture. When managed with intelligence this latter method answers very well. Where spring frosts prevail many things require protection.

Geraniums may be rooted in boxes in a sunny position. They can be placed in safety when there is danger from frost.

Iresines will bear no frost. They root easily in a frame. Take as many cuttings as are wanted, and let the old plants go. We are now spared the trouble of harbouring cuttings that in many cases was formerly necessary. Most things can be got from seed, and it is just as well or better for those with limited means to discard such things as cause a lot of labour, and substitute things easily raised.

Formerly *ageratums* had to be raised by cuttings. Now we get better strains by seed, and it is easier to raise a hundred seedlings than it is in most cases to raise half a hundred by cuttings.

Penstemons sown now would make good flowering-plants for next year. Of course, in this case there is no certainty of getting any particular colour, but few will care about that, and the uncertainty has its own charm of anticipation, while good things are sure to come. Those who require the finest forms and a choice of colours must still have recourse to the established florists' named varieties.

THE HEMP INDUSTRY.

W. H. FERRIS.

WITH the improved market an increased number of mills have resumed operations in the Manawatu and Marlborough districts. The figures giving the number of bales graded during January show an increase for the month over the December total of only 298 bales; but in the Auckland Province the continued drought led to such a shortage of water for washing purposes that several mills have had to close down, the number of bales graded at Auckland last month being 282, against 421 in December. Some of the mills which have recently resumed operations have not yet forwarded fibre for shipment, so that the returns of last month do not represent the rate of increased production.

The quality of the hemp milled was maintained at a fairly good standard. At the Wellington and Foxton ports (grading-centres which dealt with 5,930 bales out of a total for the Dominion of 6,943 bales) there was a good increase in the standard of the hemp forwarded, the number of bales of fine, good-fair, and high-pointing-fair being 5,240. The improved work has been brought about by the higher prices offering of late for good-fair, and high-pointing-fair parcels. The Wairarapa and Hawke's Bay mills have been doing exceptionally good work. In the latter case one mill sent forward a line of 272 bales, all of which was graded good-fair—a remarkably uniform line of exceptional quality. Though the Wairarapa millers have not been able to secure such a good colour as they usually do (owing to the very dry season militating against effective bleaching) the mechanical processes have been so well carried out that, assisted by good leaf, they have been able to again send forward straight lines of fine quality, splendid samples of phormium-fibre.

A very good demand has set in for tow, the prices offering being decidedly profitable. A satisfactory standard of quality is being maintained.

The cinematograph operator of the Department has taken a series of moving pictures illustrating the phormium-fibre industry, a film of which has been sent to the Panama Pacific Exposition. Leading millers have expressed their admiration of the pictures, which they consider are the best moving studies of the industry which have yet been taken.

COMMERCIAL INTELLIGENCE.

SUPPLIES FOR THE NAVY.

THE Prime Minister, the Right Hon. W. F. Massey, P.C., has received from the High Commissioner, the Hon. T. Mackenzie, a copy of a letter from the Secretary of the Admiralty to the Under-Secretary of State for the Colonies on the subject of the purchases by His Majesty's Government of the products of the dominions wherever possible during the war.

A paragraph in the report reads: "I am to request that an assurance may be conveyed to the Governments of the Commonwealth of Australia and of the Dominion of New Zealand that their Lordships will at all times be pleased to be furnished with particulars of any Australian or New Zealand manufacturers or producers who may be able and willing to quote for the supply of stores used in the Royal Navy, and any applications from such firms will receive their Lordships' most favourable consideration."

The High Commissioner mentions in his covering letter that he has brought the names of all New Zealand firms likely to be of use to the Admiralty and the War Office under the notice of these Departments.

DELAYS IN UNLOADING PRODUCE AT PORT OF LONDON.

MR. W. WRIGHT, the New Zealand Dairy-produce Inspector, in writing, under date of London, 22nd December, of the difficulty being experienced in securing the unloading with despatch of New Zealand vessels, owing to the shortage of labour and other difficulties, says,—

"Yesterday I was advised that it is more than likely that the 'Pakeha's' cargo will not be discharged until after the Christmas holidays. There is a great difficulty in getting away the produce from the docks owing to the lack of transport material. There seems to be a great shortage of barges, railway-vans, and road-wagons, which means that, although the produce is discharged from the steamers, merchants have great difficulty in getting delivery of their goods. The position of things at the present time is sufficient indication to me that there is very likely a great probability that we are going to suffer a good deal of inconvenience at this end. It will also mean that while markets hold good the bulk of the produce will be sent away direct from the docks."

WHEAT SHIPMENTS FROM VANCOUVER.

THE Port of Vancouver is not yet equipped in an adequate manner to take care of grain shipments as demanded by modern methods. This disability will, however, be shortly overcome. The Canadian Government, anticipating that much grain will eventually move via Vancouver, is making the necessary storage provision. It intends constructing a grain-elevator having a capacity of 1,300,000 bushels. This, with the equipment, will cost in the neighbourhood of £350,000. The building will be constructed of reinforced concrete. The site is now in course of preparation. This is at the shore end of the big Government dock now in course of construction on the south shore of Burrard Inlet.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith. The question should be written only on one side of the paper.

ARTICHOKES.—A SPRAYING-OUTFIT.

S. A. APIARY, Coromandel :—

1. What is the best kind of artichoke to plant for table use?

2. What is the best spraying-outfit most suitable for an orchard of about 1 acre? The orchard contains about one dozen very large old trees, and also some planted the season past.

The Orchards, Gardens, and Apiaries Division :—

1. The red-skinned variety of artichoke is the best.

2. A suitable spraying-outfit for an orchard of about 1 acre is the "Eclair" knapsack sprayer—No. 1, holding 3½ gallons fluid, price £2 10s.; or the No. 2, "Comete," holding 2½ gallons, price £2 5s.

LAYING OUT AN ORCHARD.

"ORCHARD," West Coast :—

I propose putting an acre of land under apple-trees. Could you supply me with a plan for same? What variety of apple would you advise planting for commercial purposes? What is the best season for planting? Is it possible to get much fruit the first year? At what age would you advise planting?

I propose planting potatoes between the trees. Will the manure that is used for the potatoes be beneficial to the trees, or otherwise?

The Orchards, Gardens, and Apiaries Division :—

A copy of bulletin giving directions for fruit-tree planting, together with plan, has been posted you. Scurmers, Jonathans, Munroe's Favourite, and Dougherty's are all good commercial varieties. You will be advised by letter as to the most suitable variety for your district. The best time of the year for planting is in the autumn, provided the ground has been prepared beforehand and is not too cold and wet; otherwise it is advisable to defer setting out until favourable conditions prevail in the spring. It is not advisable to allow the trees to produce fruit during the first year; all the growth during the first two or three years should go in laying a foundation for the trees to bear freely later on. Yearlings on two-year-old stocks, with straight rods, are generally preferred for planting. Potatoes may be planted between the rows, keeping out about 4 ft. from the trees, and increasing this distance each year as the trees develop. The manure used with the potatoes should ultimately benefit the trees.

R. M. :—

LOGANBERRY-CULTURE.

I should be greatly obliged for information *re* growing loganberries. Will they grow from cuttings, and, if so, would they fruit the next season? Would they grow in a very exposed position, or do they require shelter? Also, how are they pruned? When suckers come up from the root should they be left or removed at once?

The Orchards, Gardens, and Apiaries Division :—

The loganberry may be propagated from cuttings, and should bear fruit the first season. It is advisable to provide shelter to a certain extent if planted in a very exposed position.

The old bearing-rods may be cut away each season as soon as fruiting is over, the new rods that have formed being kept to replace the old ones. Any suckers should be removed as soon as they appear.

The branches should be trained along wires stretched on posts.

GRAPE-VINES UNDER GLASS.

"Subscriber," Reefton :—

I have been informed that grapes and tomatoes cannot be successfully grown together in the same glasshouse. If so, could you explain why?

A recent experiment tried locally seems to bear out this statement. A grape-vine several years old had yielded good fruit previously. This season tomatoes were also planted in the same hothouse. The grapes are now about the size of peas, and within the last week or two have become covered with a cream-coloured mildew which floats off upon the grapes being placed in water. Is the tomato-plant to blame? A few years ago a former owner of the property tried the same experiment with similar results. The season since the end of October has been very wet.

The Orchards, Gardens, and Apiaries Division :—

It is not advisable to grow grapes and tomatoes in the same glasshouse, for the reason that it is quite possible for the tomatoes to become infected with a disease or pest which would seriously affect the grape leaves and fruit. Moreover, the sprays used on tomatoes are not at all suitable for grapes. If specimens of the affected grapes are forwarded they will be examined and a report supplied you.

LETTUCE-CULTURE.—GARDENING.—BORDEAUX MIXTURE.

"Amateur," Gore :—

1. Owing to the excessive rain and strong winds here this season I have been unable to raise any lettuces, and was thinking of making a frame, and trying these vegetables under glass. Is this practicable, and how should I go about it?

2. Can you recommend a good book on general gardening for an amateur?

3. Bordeaux mixture: Is it desirable to make this yourself when you use only about 3 gallons at one spraying, or would you get the same result by using the Bordeaux preparations obtainable from seedsmen?

The Orchards, Gardens, and Apiaries Division :—

1. It is quite practicable to grow lettuce under glass, although rather expensive. A frame can easily be made to size desired. It should be about 2 ft. at high side, falling to about 1 ft., and sloping to the sun. The top, which is of glass, can be made either to slide back and forward, or on hinges so that it can be raised. Another plan, instead of a frame, is by means of kerosene-tins, which are cut in two and placed round each plant, with a small sheet of glass on top, weighted with a stone.

2. "Gardening in New Zealand," by Murphy, is a handy book; also "New Zealand Gardening," by Lockhart. Full information is, however, given each month in the *Journal*.

3. The freshly made Bordeaux mixture has been found to be the most reliable.

CARROT-GROWING.

ROBERT GARDNER, Palmerston North :—

All my early planted carrots have gone to seed. I shall be glad to know the cause, and what I should do in future to prevent it.

The Orchards, Gardens, and Apiaries Division :—

Owing probably to the dry weather experienced, the carrots have received a check which has caused them to bolt to seed. Fairly good soil and deep cultivation are essential for the successful growing of carrots.

ONION-CULTURE.

"BETA" :—

I have been informed by a successful grower of onions in England that he found charcoal a valuable manure for them. In transplanting I have noticed the roots of some plants had penetrated a piece of charcoal which came up with them, and could not be detached without cutting. Soot is known to be the great onion-fertilizer, and what is it but finely divided charcoal, with perhaps a small amount of potash and other substances present in the wood from which it was produced? Do you think the use of charcoal would be beneficial?

In Mr. Taylor's instructions for transplanting onions he advises laying them in a trench and drawing the earth over the roots. I found if a shower of rain fell during the next day or two before the plants had time to assume an upright position the roots on one side were exposed, and I considered it necessary to draw up more soil to cover them. Do you think this was needless, or would they have buried themselves in the earth as the onion lifted itself up?

Is it advisable to draw the soil away from the bulb as it begins to enlarge in order to keep as much of it as possible above ground? I have been told that it is advisable to bend over the stalk as the bulbs get larger to induce growth there rather than in the upper part. Do you agree with this?

Mr. W. H. Taylor, Manager, Arataki Experimental Farm :—

The value of charcoal would doubtless be largely ruled by the character of the soil. If of a heavy nature a moderate quantity would be valuable. All plants have an affinity to charcoal. A properly made vine-border should contain charcoal. Many pot-plants are immensely benefited by a small quantity of charcoal in the soil. It is generally thought the chief effect is keeping the soil sweet. It has some fertilizing properties also. I have not heard of it being applied to onion-culture.

If when drawing the soil over the roots of the young onion-plants it were pressed down with the feet of the operator, rain would not uncover the roots. I am inclined to think they were laid too flat. Let the tops rest against one side of the drill.

There should be no necessity to draw soil away. I cannot understand the need of it. The bulbs usually grow on the top of the soil.

Bending the tops is an English custom that I do not find necessary in this climate. I think it best not to do it. As every rule is said to have its exception, so has this. In most cases it is not necessary; and if not necessary, then it is bad. But in wet seasons sometimes the tops will grow too late. If when there is a sign of general ripening off some of the tops look like continuing to grow, bend them down. It should be done with a twist and so as not to break the tops.

HEDGES.

ROBERT SHEARING, Torio :—

I have a holly hedge I want to transplant. If it is cut down, say, a foot from the ground, and shifted in May, would it grow? Will hawthorn stand shifting the same way?

The Orchards, Gardens, and Apiaries Division :—

Yes, both can be moved in late autumn, but it will probably prove rather expensive. A new hedge would give more satisfaction in the long-run.

FODDER CROPS.

"BRITISHERS," Orini, Taupiri :—

1. What crop would you suggest as suitable for a 20-acre paddock now in oats to be cropped? The paddock is not yet sufficiently advanced for laying down grass, it has been twice ploughed for turnips and oats, and was before tea-tree swamp. We want a crop suitable for grazing by dairy cows, and intend laying same down in the autumn, 1915. The paddock has drains round it, but not yet thoroughly dry.

2. Do you recommend drilling or broadcasting Italian rye and Western Wolths?

The Fields and Experimental Farms Division :—

1. The following mixture has given splendid results, and may prove equally successful on your land: Russian barley, 2 bushels per acre; black Scotch tares, 1 bushel per acre; Essex rape, 1½ lb. per acre. Basic slag at the rate of 2 cwt. per acre would assist the crop.

2. It is preferable to broadcast Italian or Western Wolths rye-grass seed.

ERADICATION OF FERN.

T. H., Kaikoura :—

Will you kindly give me some information with regard to the best means of getting rid of fern on hill country—land not ploughable?

The Fields and Experimental Farms Division :—

Burning and crushing with stock is probably the only practical method of dealing with fern on unploughable land. The fern should be burnt off late in February or early in March, and the land sown with a mixture of grasses known to succeed well in the locality. When the young fern-shoots appear in the spring the land should be stocked heavily with full-grown sheep (preferably wethers). The affected area should be subdivided closely, in order that the stock may be better controlled. The sowing of *Danthonia pilosa* is recommended by some farmers, as it may be burnt off several times without injury.

A CATTLE-PROOF HEDGE.

G. H. G., Gordonton :

Can you advise me as to the best hedge to grow on kahikatea swamp land to make a good cattle-proof fence? Parts of the land in question are dry, and other parts are inclined to be wet. I feel fairly confident that African boxthorn would do on the drier parts, but I am a bit dubious as to the wetter parts. I have had experience of boxthorn in Taranaki, and while it makes a good fence is it not a great robber of the soil? Can you advise anything better, and how would you advise planting—on bank or on the flat? The cost of keeping in order after the fence is established would, of course, be a consideration.

The Orchards, Gardens, and Apiaries Division :—

The African boxthorn would suit on the drier land. So long, however, as the land is not very wet I should be inclined to plant *Eleagnus*. If the long shoots of this plant are interlaced while the hedge is growing it makes a close and excellent stock-proof fence. Moreover, it is free from the objectionable thorns of the African box.

DISEASE AFFECTING POTATOES.

JOHN WILSON, Kakanui :—

I am forwarding you under separate cover sample of seed potatoes. Would you kindly inform me if it is an insect or a disease that is affecting them, and what would be the best treatment? In some instances they seem to be growing splendidly, but all at once they begin to wither off, and when I dig down I find that the shaw has become disconnected from the seed and is beginning to rot; and in other cases, when there appears to be a blank, when I scrape away the soil I find

that the main sprout has decayed and the seed has commenced to make fresh shoots, as you will see in the sample. I may state that some of the land has been six times ploughed, and one part of it was ploughed twice after oats. The two big shaws in the bottom of the box came off of lea land ploughed three times. The soil is light in one end of the plot and tarry in the other, and I notice the decaying plants in both classes of soil are affected in the same way.

The Fields and Experimental Farms Division :—

The specimens have been carefully examined. They are affected with a fungus disease known as *Rhizoctonia*. This disease is conveyed in the tubers, and there is really no practicable methods of control. Affected seed tubers have often a tinge of black at the root-end, and when this disease is suspected it is advisable to cut the seed before planting to ascertain if it is healthy. There seems to be some connection between what is termed "running out of the seed" and *Rhizoctonia* attack.

PASSION-FRUIT CULTURE.

E. A. Allan, Opotiki :—

Will you please inform me as to the habits of the passion-fruit: are there different varieties, early and late? When do the different varieties ripen, and when is the best time to sow the seed? At what age and season should transplanting be done? Any other information on this subject will be welcome.

The Orchards, Gardens, and Apiaries Division :—

There are different varieties of passion-fruit. The one you require for market purposes is *Passiflora edulis*. This is practically the only variety that is planted for commercial purposes. The seed should be planted in shallow boxes in the early spring or late autumn, and transplanted in late autumn, when about 4 in. high. For market purposes they might be set out about 10 in. or 10 in. apart, provision being made for proper trellises to carry the growth and fruit as in the case of vines.

RADDLE FOR MARKING SHEEP.

"Anxious," Whangape :—

Will you kindly give me instructions for making a good raddle or marking-fluid for sheep? Will Crawshaw's dyes do, or will they lessen the value of the wool?

The Live-stock and Meat Division :—

Recognizing the possibility of damage to the wool, the use of dyes for wool-branding purposes is not recommended. There are several excellent sheep-branding "oils" on the market, which are effective and lasting, and which do not harm the wool.

GRASS FOR CRICKET-GROUND.

C. B. Allen, Huiroa, Utiku :—

I shall be obliged if you will tell me the best means of procuring a good sole of grass on a cricket ground, the soil of which is light and contains a good deal of iron-sand. The sole of grass is thin, and there are a great many weeds. The ground has merely been levelled, and the existing turf replaced. If you advise artificial manures, please state what kind and quantity.

The Fields and Experimental Farms Division :—

If possible, plough the field and work up with disc and fine harrow, thereby getting rid of the weeds, and providing a good seed-bed for the grass mixture. The following mixture should provide a good close sole of grass: *Poa pratensis* (Kentucky blue), 15 lb. per acre; *Poa trivialis*, 5 lb. per acre; red top, 15 lb. per acre; brown top, 15 lb. per acre; *Danthonia pilosa*, 5 lb. per acre; fiorin, 5 lb. per acre; sheep's fescue, 3 lb. per acre; hard fescue, 3 lb. per acre.

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1915	137,816	296,439	45,622	339	138,081	85,123	87,393	..	..	2,860	683	..	1,209
,,	*1914*	*231,766*	*464,185*	*30,424*	*33*	*150,492*	*136,086*	*108,742*	..	*500*	*2,851*	*15,234*	*4,306*	*11,133*
February,	1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
,,	*1913*	*326,337*	*403,698*	*12,666*	*64*	*89,098*	*81,733*	*127,968*	..	..	..	*12,520*	*4,295*	*7,973*
March,	1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
,,	*1913*	*86,224*	*210,166*	*7,428*	*250*	*47,560*	*59,844*	*49,661*	..	*115*	..	*12,552*	*7,662*	*4,043*
April,	1914	234,765	366,786	22,185	..	7,822	63,796	58,488	..	2,901	..	1,247	888	5,909
,,	*1913*	*303,937*	*647,948*	*16,834*	*457*	*11,358*	*52,934*	*61,988*	..	*300*	..	*9,049*	*3,351*	*3,889*
May,	1914	336,632	638,397	39,315	54	837	37,776	43,364	3,623	11,062	..	8,355	2,112	9,316
,,	*1913*	*418,221*	*731,520*	*22,073*	*100*	*637*	*46,304*	*33,281*	..	*265*	*2,000*	*15,751*	*5,005*	*9,057*
June,	1914	261,877	634,981	36,400	..	1,153	19,247	18,774	..	28,141	1,000	7,924	4,258	7,881
,,	*1913*	*315,034*	*528,815*	*24,444*	*588*	*79*	*3,166*	*18,741*	..	..	*13,072*	*13,592*	*4,065*	*5,439*
July,	1914	225,411	239,143	38,170	..	1,355	2,003	15,868	..	1,425	1,000	5,810	2,584	8,053
,,	*1913*	*215,713*	*331,353*	*14,030*	..	..	*1,687*	*17,169*	*5,651*	*300*	*9,190*	*9,682*	*1,720*	*10,793*
August,	1914	84,251	63,111	19,094	516	1,979	50	4,845	600	38,220	10,403	367	245	3,705
,,	*1913*	*161,593*	*178,263*	*13,129*	*6*	*8*	*407*	*8,494*	*11,604*	*45*	*38,480*	*3,714*	*2,310*	*6,406*
September,	1914	53,386	49,200	2,353	..	15,885	..	3,337	..	5,896	7,288	1,143	57	..
,,	*1913*	*133,122*	*8[illegible],521*	*5,334*	*16*	*6,575*	*2,020*	*7,176*	..	..	*16,336*	*3,826*	*1,501*	*10,049*
October,	1914	291,432	128,016	49,104	..	81,842	30,487	8,938	..	68,660	38,121	2,042	1,050	1,683
,,	*1913*	*14,122*	*25,735*	*580*	..	*42,847*	*21,452*	*2,705*	..	..	*10,020*	*6,986*	*3,672*	*2,923*
November,	1914	136,346	27,577	48,302	27	98,729	70,048	37,604	15	24,289	35,783	885	110	1,377
,,	*1913*	*20*	*1,479*	..	..	*53,468*	*23,722*	*1,891*	..	..	*2,478*	*4,162*	*771*	*2,314*
December,	1914	192,952	149,835	44,876	..	172,990	80,114	86,317	..	..	9,306	1,136	116	2,157
,,	*1913*	*128,087*	*86,890*	*8,909*	..	*249,526*	*124,821*	*51,385*	..	*250*	*24,479*	*19,807*	*5,276*	*11,273*

HEMP AND TOW GRADING RETURNS.

JANUARY.

Hemp.—The total number of bales graded was 6,943, as compared with 11,886 for the corresponding month of last year, a decrease of 4,943 bales. For the twelve months ending 31st January, 1915, the number of bales graded was 93,301, as compared with 165,720 for the previous twelve months, a decrease of 72,419 bales.

Tow.—During the month 1,901 bales were dealt with, as compared with 4,276 for the corresponding month of last year, a decrease of 2,375 bales. For the twelve months ending 31st January, 1915, the number of bales graded was 47,618, as compared with 55,752 for the previous twelve months, a decrease of 28,134 bales.

Stripper-slips.—During the month the number of bales graded was 115, as compared with 203 for the corresponding month of last year, a decrease of 88 bales. For the twelve months ending 31st January, 1915, the number of bales graded was 1,274.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF JANUARY, 1915.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	..	99	142	41	..	..	282
Napier	..	..	272	..	..	..	..	..	272
Foxton ..	..	..	1,303	1,411	198	51	17	2	2,982
Wellington ..	..	132	1,011	1,515	221	54	14	1	2,948
Blenheim ..	..	66	..	..	..	..	..	..	66
Picton ..	..	63	36	..	..	..	..	..	99
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	62	24	..	..	..	..	86
Bluff	..	..	23	78	101	6	..	..	208
Totals ..	..	261	2,707	3,127	662	152	31	3	6,943
Percentages of totals	..	3·75	39·03	45·03	9·53	2·18	0·44	0·04	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	52	78	4	134
Napier	..	..	36	..	36
Foxton ..	242	300	59	5	606
Wellington ..	127	391	72	16	606
Blenheim ..	..	..	41	..	41
Picton	..	59	..	..	59
Lyttelton ..	..	159	10	..	169
Dunedin ..	37	18	..	..	55
Bluff	..	89	101	5	195
Totals ..	406	1,068	397	30	1,901

Stripper-slips.—Foxton: First grade, 8; second grade, 89—total, 97. Wellington: First grade 9; second grade, 9—total, 18.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since August last:—

—	"Moana," 16th Sept.	"Marama," 15th Oct.	"Maitai," 12th Nov.	"Moana," 10th Dec.	"Marama," 7th Jan.
Gum, packages	6	30	12	10	..
Seeds, sacks	..	..	..	..	..
Grain, &c., sacks	172	107	32	169	36
Meat, cases	48	8	37	16	82
Onions, cases	3	7	2	5	9
Potatoes, sacks	3	29	3	10	26
Sundries, packages	1,512	328	629	403	287
Butter, boxes	..	5	4	521	180
Hemp, bales	98	114	456	331	..
Frozen lamb, carcases	4	2	5	5	2,202
Hides and sheep-skins, sacks and bales	517	463	250	88	145
Beef, quarters—pieces	..	..	..	..	20
Veal, carcases	..	..	..	..	26
Cheese, crates	..	..	..	..	154
Sheep-skins, bales	..	..	..	..	48

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since August last:—

—	"Makura," 8th Sept.	"Niagara," 1st Oct.	"Makura," 29th Oct.	"Niagara," 1st Dec.	"Makura," 29th Dec.
Butter, boxes	6,036	5,950	4,850	3,650	2,350
Mutton, carcases	..	..	..	..	..
Lamb, ,,	..	..	..	..	..
Beef, quarters—pieces	..	..	..	..	..
Veal, carcases	..	..	..	..	..
Frozen sundries, packages	30	36	..	..	..
Wool, bales	..	127	109	348	165
Grass-seeds, beans, &c., sacks	..	26	..	23	..
Hides and skins, sacks, &c.	..	1,103	1,054	2,442	1,984
Onions, cases	..	..	..	..	..
Sheep-skins, bales	6	152	..	522	501
Jam, cases	65	590	..	25	..
Sundries, packages	4	603	45	34	53
Pelts, casks	1	..	34	25	28
Kauri-gum, packages	6	1,277	840	10	89
Hemp, bales	246	744	246	..	..
Rabbits, crates	..	..	..	..	..
Timber, pieces	..	..	..	..	..
Eggs, cases and crates	149	247	974	255	..
Meats (canned, &c.), cases	35	36	..	..	..
Cheese, crates	..	..	..	..	..
Fresh fruit, cases	..	..	..	..	..

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of January, 1915:—

Port of Shipment.	Horses.			Sheep.			Cattle.			Pigs.		Dogs.	
	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To U.S. of America.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.
Auckland ..	6	9	..	..	92	..	..	30	..	..	49	2	5
Gisborne ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington	2	..	..	..	..	15	..	..	..	..	..	3	..
Lyttelton ..	1	..	..	63	..	..	..	..	..	..	..	1	..
Dunedin ..	2	..	..	..	..	..	..	..	..	..	..	1	..
Bluff ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals ..	11	9	..	63	92	15	..	30	..	..	49	7	5

Auckland also exported 8 crates of poultry to the Pacific islands.

The following are particulars of horses exported: Thoroughbred, 6; trotting, 2; draught, 9; light horses, 2; pony, 1.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of January, 1915:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			QUAIL ISLAND, LYTTELTON.		
1	Collie ..	Male ..	London ..	J. Linton ..	Lincoln College.
1	,, ..	Female	,, ..	J. Lilico ..	Lochiel.
1	Border Leicester	Male ..	,, ..	D. M. Sutherland	Timaru.
4	,,	Female	,, ..	,,	,,

WHEAT-PRODUCTION IN U.S.A.

THE following figures give the production of wheat in the United States of America from 1900 to 1914, in bushels:—

1900	522,000,000	1908	665,000,000
1901	749,000,000	1909	683,000,000
1902	670,000,000	1910	635,000,000
1903	638,000,000	1911	621,000,000
1904	522,000,000	1912	730,000,000
1905	693,000 000	1913	763,000,000
1906	735,000,000	1914	891,000,000
1907	634,000,000		

THE FRUIT TRADE.

RETURN SHOWING THE NUMBER OF CASES OF APPLES AND PEARS IMPORTED INTO NEW ZEALAND DURING THE YEARS 1913 AND 1914 (DECEMBER).

Port.	Australia (including Tasmania).				Canada and United States.			
	Apples.		Pears.		Apples.		Pears.	
	1913.	1914.	1913.	1914.	1913.	1914.	1913.	1914.
Auckland ..	2,741	6,191	951	146	38,298	20,171	761	60
Wellington ..	3,934	5,919	4,404	647	17,277	9,315	1,493	Nil
Christchurch ..	296	200	Nil	Nil	5,264	3,200	81	Nil
Dunedin ..	5,105	4,234	2,522	302	8,393	7,502	60	40
Bluff	3,054	1,877	2,050	1,334	455	199	Nil	Nil
Total ..	15,130	18,421	9,927	2,429	69,687	40,387	2,395	100

GRAND TOTAL.

1913 .. .. .. 97,139 cases.
1914 .. .. .. 61,337 "

FRUIT EXPORTED FROM DOMINION DURING EXPORT SEASONS, 1913 AND 1914.

1913 .. .. .. 33,000 cases.
1914 .. .. .. 67,964 "

AGRICULTURAL SHOW DATES.

Hawke's Bay A. and P. Society.—Hastings, 2nd and 3rd March, 1915.

Ashburton A. and P. Association.—Ashburton, 17th and 18th March, 1915.

Southland Metropolitan A. and P. Association.—Invercargill, 18th, 19th, 20th, and 21st May, 1915.

Otago A. and P. Association.—Dunedin, 1st, 2nd, 3rd, and 4th June.

Waikato Winter Show Association.—Hamilton, 1st to 5th June, 1915.

Manawatu and West Coast A. and P. Association.—Palmerston North, 22nd, 23rd, 24th, and 25th June, 1915.

South Taranaki Winter Show.—Hawera, 30th June, 1st, 2nd, and 3rd July.